AD NUMBER

AD832698

LIMITATION CHANGES

TO:

Approved for public release; distribution is unlimited.

FROM:

**Distribution authorized to U.S. Gov't. agencies and their contractors;
Administrative/Operational Use; 14 DEC 1959.
Other requests shall be referred to Space and Missile Systems Organization, Los Angeles, CA.**

AUTHORITY

SAMSO ltr 28 Feb 1972

[redacted]

UNCLASSIFIED

PRELIMINARY

OPERATING AND MAINTENANCE INSTRUCTIONS FOR LAUNCHER HYDRAULIC AND PNEUMATIC SYSTEMS (B, C, D(R&D) SERIES)

ZM-7-516A (TN)

(This publication replaces ZM-7-516 (TN) dated 11 May 1959)

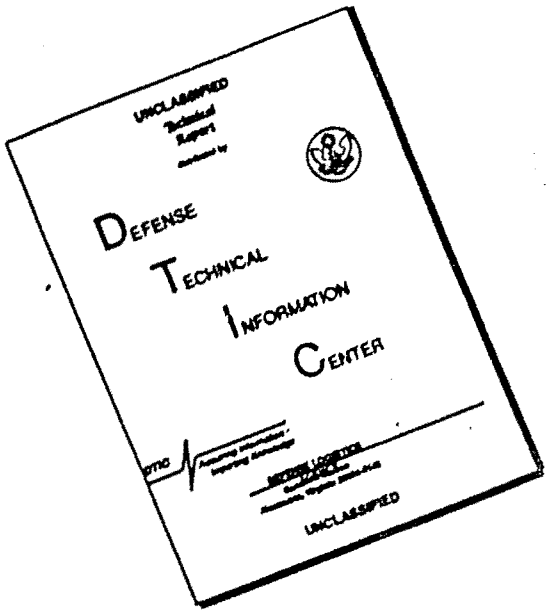
Published by Support Publications for the

HYDRAULIC DESIGN GROUP
ENGINEERING DEPARTMENT

CONVAIR (ASTRONAUTICS) DIVISION
GENERAL DYNAMICS CORPORATION

UNCLASSIFIED

DISCLAIMER NOTICE



THIS DOCUMENT IS BEST QUALITY AVAILABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

LIST OF EFFECTIVE PAGES

Total number of pages in this publication is 38 consisting of the following:

Page(s)	Date of Issue
Title	14 December 1959
"A"	14 December 1959
*i	14 December 1959
ii	Original
1-1 thru 1-4	Original
2-1 thru 2-16	Original
3-1 thru 3-2	Original
*4-1 thru 4-6	14 December 1959
5-1 thru 5-2	Original
6-1 thru 6-4	Original

PREPARED BY H. L. Frisbie — GROUP HYDRAULICS DESIGN

CHECKED BY R. H. Snow — APPROVED BY C. Bierman, Jr.

EDITED BY T. A. Brody

Additional copies of this publication may be obtained by written request to Engineering Distribution, Mail Zone 521-27, Convair-Astronautics.

UNCLASSIFIED

[redacted]

A 13436

CONVAIR (ASTRONAUTICS) DIVISION
GENERAL DYNAMICS CORPORATION

521-65

14 December 1959

To: Holders of Preliminary Operating and Maintenance Instructions Manuals

From: Support Publications

Subject: Addition of Revision A to ZM-7-516, POMI for Launcher Hydraulic and Pneumatic Systems, B, C, D, R&D Series.

Substitute the attached title, "A", i, and 4-1 thru 4-5 pages, dated 14 December 1959, for the original title, "A", i, and 4-1 thru 4-5 pages, dated 11 May 1959.

This page becomes unclassified when the substitution has been made.

Loyd D. Andrew
Support Publications
Bldg. 26, Plant 71
Extension 2636

[redacted]

UNCLASSIFIED

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS (Cont)

SECTION I

INTRODUCTION

1-1. PURPOSE.

1-2. This manual provides preliminary operating and maintenance instructions for the launcher hydraulic and pneumatic systems for the B, C, and D(R&D) series missiles. The launcher systems for Sycamore 7-80-5 and -7, AFMTC 7-80-8, -9, -10, and -11, and ERB 7-80-2 and -4 are covered in this manual. The Components and pressure settings are applicable to B, C, and D(R&D) series missiles. This manual will be revised as additional information is obtained through actual operating and maintenance experience at the factory and the test sites. Complete reissues of the manual will be made periodically.

1-3. Personnel concerned with this equipment can contribute to the effectiveness of the revised manuals by forwarding comments and suggestions to the cognizant design group or to Support Publications, Convair-Astronautics.

NOTE

Dash numbers of part and installation drawings have been purposely omitted from the text. The applicable schematic drawing should be referred to for dash number identification.

1-4. DESCRIPTION OF THE SYSTEM.

1-5. The primary functions of the launcher hydraulic and pneumatic systems are to initiate a stabilized and captive holddown of the missile until full engine thrust is developed, supply a synchronous release and provide a controlled rate of acceleration for the first seven inches of missile travel. The secondary functions are to aid in ground handling and control of the missile during erection, to actuate retraction of the launcher auxiliary frames during missile release, to provide rise-off clearance, to aid in control of liquid nitrogen (B and C series), liquid oxygen and fuel supply to the missile, and to provide various service hydraulic, pneumatic and purge lines routing from ground stub-ups via launcher to missile disconnects.

1-6. The missile release is accomplished by means of two pneumatic release cylinders (see figure 1-1 and 1-2) from which the pressure is released at a controlled rate. The two pneumatic release cylinders are synchronized by means of a hydraulic slaving system which is powered by a single pneumatic actuating cylinder. The pneumatic cylinder is triggered by the positioning of a solenoid valve providing nitrogen pressure to the cylinder.

1-7. Two stabilizer cylinders and a temperature compensator are mounted on the auxiliary frames (see figure 1-1 and 1-2). Their function is to provide uniform vertical support and to maintain vertical alignment of the missile when erected on the launcher. Vertical alignment and synchronization control are accomplished by hydraulic sections of the stabilizer cylinders and temperature compensator. Uniform vertical support is accom-

Illustration to be Furnished When Available

Figure 1-1. Launcher Holddown and Release System B and C Series (7-89007 Sheet 2)

Illustration to be Furnished When Available

Figure 1-2. Launcher Holddown and Release System, D(R and D) Series, (7-89007 sheet 3)

plished by the pneumatic sections of the stabilizer cylinders. The vertical synchronization is shown by means of visual indication on the stabilizer meter.

1-8. During missile rise-off, the auxiliary frames must be moved outward to clear the missile in the event of missile drift during the first few feet of rise. To accomplish this, the two pneumatic auxiliary support retraction cylinders (see figure 1-1 and 1-2) are preloaded to swing the frames outward as soon as the stabilizer pins are disengaged (after approximately two inches of missile rise).

1-9. Fluid lines to the missile lead from ground stubups, through flexible hoses via launcher installations, and terminate at two rise-off disconnect ground installations (B and C Series). These ground coupling installations can be raised or lowered to engage or disengage the airborne rise-off disconnects. The liquid oxygen and fuel disconnects mount separately with special control valves at the rise-off points. For B and C Series, the hydraulic reservoir charge lines are routed via the launcher and are connected to the missile with flexible hoses. For D(R and D) Series installations, the hydraulic reservoir charge line is not routed on the launcher; charging is accomplished by hose connection directly to the 7-08411 Nitrogen Charge Panel. (See POMI AZE-27-188.)

1-10. The purge system furnishes gaseous nitrogen, trichoroethylene, and lithium chloride (D(R and D) Series) by flexible hoses from the ground stubups to a control valve installation mounted in Quad I on the launcher. From this control installation, the lines are routed via the launcher to either the rise-off disconnect installations or the propellant fill and drain control valves. (See figures 2-2, 2-3, 2-4, and 2-5.)

1-11. LIST OF REFERENCES.

1-12. REPORTS.

AZE-27-188	POMI for Launcher Charging Panel, D series.
AZE-27-192	POMI for Launcher Hydraulic and Pneumatic System, D Series.
AZM-27-044	Checkout Procedure for Launcher Hydraulic and Pneumatic Systems, D Series.
AZM-27-046	Leak Testing Procedure for Launcher Hydraulic and Pneumatic Systems, D (R and D) Series.
ZE-7-087A	Preventative Maintenance Technical Manual, Pneumatic Booster Unit.
ZJ-7-048	POMI for Pneumatic Booster Unit, B Series.
ZJ-7-049	Checkout Procedure for Launcher Hydraulic and Pneumatic System, B Series.
ZK-7-049	Propulsion System Handbook for the XSM-65 B and C Missiles, ZK-7-049.
ZM-7-193C	Operational Data for Missile Stretch Sling.
ZM-7-200C	POMI for Erecting Missile in Tower (With the 7-89290 or 7-89366 Holddown and Release Cylinders Installed on the Launcher), Model XSM-5.

ZM-7-347B	Preliminary Procedure for Leak Testing Missile Launcher Tubing Installation, B Series, ZM-7-347B.	7-89101	Schematic Diagram, Hydraulic and Pneumatic Lines, Launcher Systems, B and C Series. (See figures 2-4 and 2-5.)

1-13. DRAWINGS.

7-89100	Schematic Diagram, Hydraulic and Pneumatic Lines, Launcher Systems. (See figures 2-2 and 2-3.)	7-89000	Equipment Installation Drawing, Hydraulic and Pneumatic Booster Unit.

SECTION II

FUNCTION

2-1. FUNCTION OF MAJOR ASSEMBLIES.

2-2. MISSILE HOLDDOWN AND RELEASE SYSTEM.

a. The two 7-89366 main release cylinders, in conjunction with the 7-08396 valves (controlled by the slaving system) hold the missile captive until launch, provide a synchronous release of the pneumatically applied holddown force, and control the rate of missile acceleration for the first seven seconds of travel. By the end of 0.5-seconds and approximately 7 inches of missile travel, the missile acceleration is approximately 16 feet per second^2. The actual (release cylinder) piston-controlled travel is approximately 4 inches due to mechanical linkage. At the end of this 4-inch stroke, the piston is disengaged from the rod and moves freely along with the 7-49018 releasing mechanism. The release cylinder motion is stopped by the 7-49276 snubber cylinder. A line-mounted micronic filter, 93-78007-004, is installed with each cylinder as well as a venting valve for protection from dirt. Since a loss of pressure in the release cylinder could cause the loss of a missile, check valves, 88-30900-122, are installed in each line to prevent reverse flow in the event of a supply line failure.

2-3. SLAVING SYSTEM. (See Figures 1-1 and 1-2.)

a. Synchronous release of holddown pressure from the two main release cylinders is performed by the hydraulic slaving system. This system is a closed hydraulic circuit consisting of two master cylinders, 7-08263, linked together by a 7-89242 yoke hydraulically driving two 7-08264 slave cylinders. The two slave cylinders in turn actuate two 7-08396 pneumatic release valves. The power for driving the two master cylinders is from the 7-08265 pneumatic actuator cylinder. A four-way, three-position solenoid valve, 99-35002-001, when energized to position A, ports 1000 psig nitrogen to the 7-08265 pneumatic actuating cylinder. The rate of operation of the release slaving system must be controlled to give the desired rate of missile rise. Two 0.052-inch diameter hydraulic orifices are installed in the system. One of these orifices is located prior to each of the slave cylinders and aids in controlling travel rate of the release slaving system. A regulator, 7-08327, is installed to reduce the nitrogen pressure (from the 7-08352-803 booster unit) from 2000 psig to 1000 psig. The 7-08307 filter protects these pneumatic units from dirt.

b. The solenoid valve, 99-35002-001, is normally in the de-energized C position, venting both the slave cylinder and the pneumatic actuator cylinder. Valve position B returns the slaving system to the LAUNCH READY position. The A position of the valve actuates the release of the missile from the launcher.

CAUTION

Operating instructions for the 99-35002-001 solenoid valve must be carefully followed; improper operation could result in damage to the release cylinders or to the missile.

c. The slaving system also contains a 7-08280 compensator cylinder to allow for an oil volume change due to temperature changes. A visual scale indicates the oil level in the compensator. If the compensator should bottom out or overflow as a result of extreme temperature rise, the 7-08220 relief valve will relieve the excessive system pressure. This system is filled through the 7-08305 filter to avoid contamination. The 7-08212 check valve prevents oil loss when removing the filling connection. Hand valve, 89-34003-010, is installed to isolate the relief valve and the temperature compensator during the filling and bleeding of the release slaving system.

CAUTION

Hand valve, 89-34003-010, must be fully open for proper operation of the release system.

d. The return of the slave cylinders to the operating position is accomplished by energizing the 99-35002-001 solenoid valve to the B position; this action pressurizes the 7-08264 slave cylinders through a restrictor check valve, 7-08292, installed in a common return line. This installation eliminates the need to manually return the 7-08396 valves to the operating position.

2-4. STABILIZER SYSTEM.

a. The 7-08267 stabilizing cylinders and the 7-08279 temperature compensator are the main components of the stabilizing system. Each of the two stabilizing cylinders contain upper and lower pistons mounted on a common rod. The upper cylinders are cross-connected and are hydraulically pressurized to provide synchronous vertical motion to the pistons to keep the missile in vertical alignment. The lower pistons of the stabilizing cylinders are pressurized on the bottom side with nitrogen to maintain auxiliary support pin contact with the missile. (See figures 1-1 and 1-2.)

b. The pressure in the hydraulic portion of the stabilizing system is maintained by the 7-08279 temperature compensator which allows for a change of oil volume due to temp erature change. A tandem piston arrangemer provides a pair of chambers to which the pneu matic lines are connected.

c. As the missile is loaded with fuel and liquid oxygen, the increased weight causes the launcher to deflect at the four contact points. When the missile is fully loaded, the stabilizer pistons sink approximately 0.5 incl placing them approximately 0.55 inch from th bottom of their stroke. With no wind load, the weight distribution at the stabilizing cylinders is 34,000 pounds (Series B and C), and 38,000 pounds (Series D (R and D)). At the release point, the weight distribution is 80,020 pounds (B Series), 88,870 pounds (C Series), and 83,090 pounds (D (R and D) Series).

NOTE

All thrust and weight figures included herein are approximate and represent nominal conditions.

d. The effect of a maximum permissible 60 miles per hour side wind load in the vertical (X-X axis) plane of the stabilizer cylinder will produce an ultimate couple of 330,000

pound-feet (B and C Series) and 375,000 pound-feet (D (R and D) Series) for stress purposes at the stabilizer points. (See figure 2-1.) At the same time the compensator is pneumatically charged to a maximum couple capacity of approximately 400,000 pound-feet, preventing total exhaustion of hydraulic chamber pressure during maximum side wind load conditions.

e. The hydraulic system, theoretically, forces synchronization of the vertical motion of the stabilizer system. Launcher structure deflection and internal friction and compressibility of the hydraulic fluid, however, actually cause minor deviations from true synchronous motion.

NOTE

Missile centerline deviation should not exceed 15 minutes from true vertical.

f. When the missile is fired and rises to the captive flight position, the load forces on the launcher change as follows: The downward dead weight forces become 249,030 pounds (B Series), 266,730 pounds (C Series), and 264,450 pounds (D (R and D) Series); upward load forces become 196,690 pounds (B Series), 176,840 pounds (C Series), and 201,740 pounds (D (R and D) Series). The launcher deflects relative to the four support points. The stabilizer pistons move up approximately 1.10-inch, primarily as a result of launcher deflections. The 7-08327 regulator valve attempts to maintain a constant pressure setting corresponding to a 34,000 pound stabilizer upward force (B and C Series) and a 38,630 pound stabilizer upward force (D (R and D) Series). In use, however, the regulator supplies a sagging pressure curve of force versus stabilizer rise. The pressure delay amounts to approximately five percent of the stabilizer thrust and is not effective to the point of causing separation between the stabilizer pins and the balance support longerons.

g. During the initial missile rise, the hydraulic pistons maintain parallel alignment and balance out the wind load effects. In the captive flight position, each cylinder continues to exert the thrusts given in paragraph 2-4c, due to nitrogen pressure; this thrust insures positive contact between the stabilizer pin shoulders and the balance support longerons on the missile. In the event of a limit-condition wind load, this thrust would shift from minimum values (on one side) of 14,000 pounds (B and C Series) and 18,630 pounds (D (R and D) Series), to maximum values of 54,000 pounds (B and C Series) and 58,630 pounds (D (R and D) Series) on the opposite side. Since the stabilizers add thrust to the missile, each main release point must hold down a thrust force (per pin) of 93,340 pounds (B Series), 88,420 pounds (C Series), and 100,870 pounds (D (R and D) Series). These forces include 21,000 pounds of thrust contributed by the rise-off disconnects and exclude wind loads along the Y-Y Axis. If the missile were released under the above conditions, the stabilizing pistons would travel upward 0.1-inch to the positive uppermost stop position which is external to the cylinder. Releasing the load on the launcher would return the hydraulic pressures in the cross connections to a balanced condition; normal hydraulic pressure is 2000 psig.

h. If the missile is not released and the engine thrust decreases, the missile will move from the captive flight position approximately 1.10 inch downward to the rest position. Each stabilizer cylinder supplies increasing support during downward movement. This thrust increase is 34,000-43,500 pounds (B and C Series) and

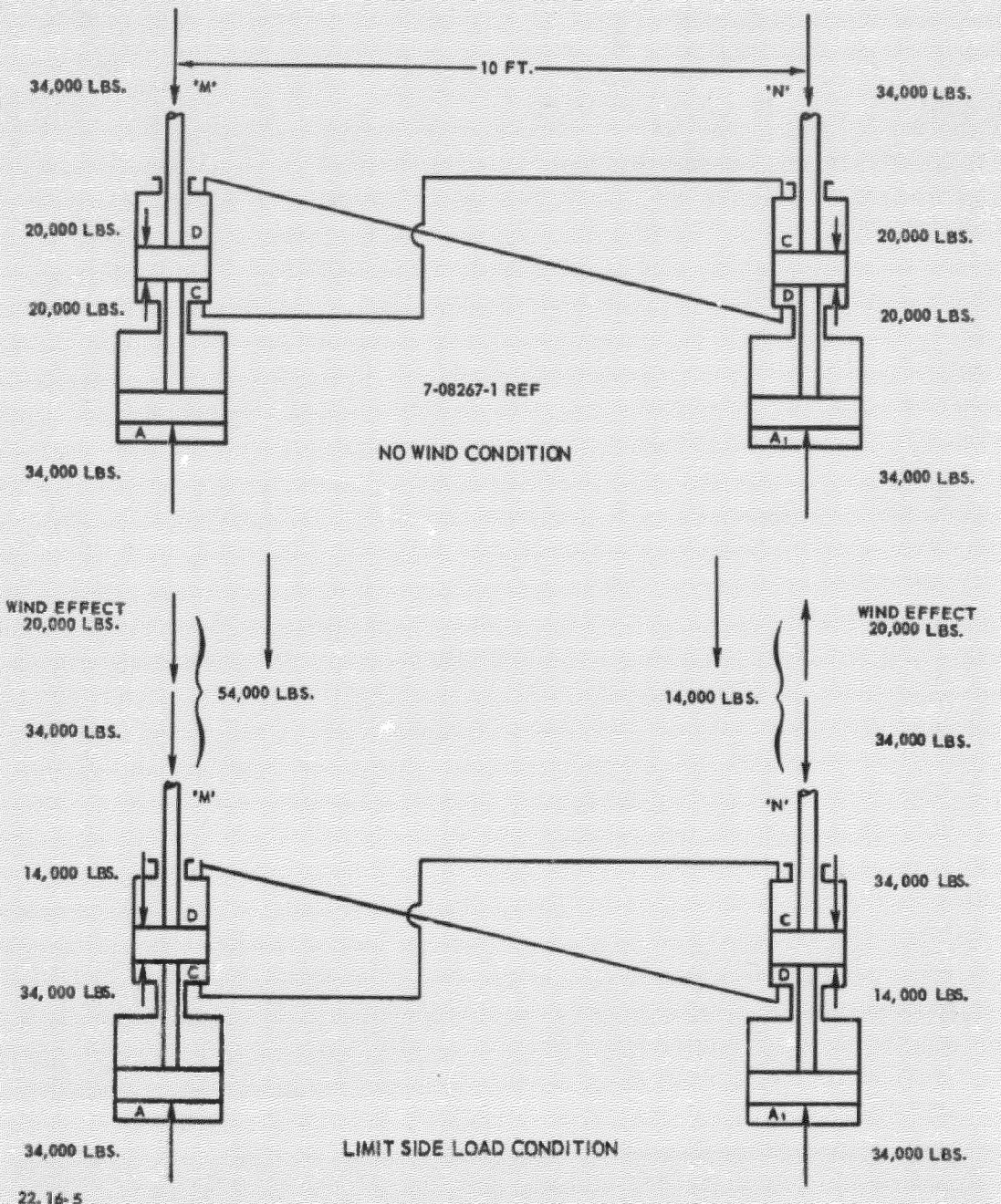


Figure 2-1. Wind Load Effect on Auxiliary Support Stabilizing Cylinders

38,630-49,500 pounds (D (R and D) Series), based on approximate isentropic compression of the nitrogen in the stabilizing cylinder and receiver. This pressure buildup has the desirable effect of decelerating the missile during downward travel.

NOTE

Some overtravel past the fully loaded position is anticipated, but not as far as the positive stop.

i. Relief valve (part of the 7-08327 regulator) and the 7-08292 restrictor check valves allow the pressure to bleed gradually in order to return the nitrogen to its initial pressure settings of approximately 1200 psig (B and C Series) and 1365 psig (D (R and D) Series). Because of environmental temperature effects and possible internal leakage through the 7-08327 regulator, the relief valve has the additional function of preventing pressure buildup at the stabilizing cylinders.

j. A 98-88500-002 receiver, installed in the pneumatic line near the stabilizer cylinder, prevents excessive deviation from the desired pneumatic pressure. The 7-08292 restrictor check valve permits excessive, heat produced, pressure to escape to the relief valve in the 7-08327 regulator.

k. During missile erection, it is necessary to relieve the pneumatic thrust from the 7-08267 stabilizer cylinders by the following means:

1. For the B and C Series, a 7-08312 three-way control valve is installed in the pneumatic line. This valve simultaneously controls the emergency helium line which is connected through the 7-08215 check valve. This line will supply pressure to support the missile in the event of failure of normal nitrogen supply. The 7-08306 pressure switch in the normal nitrogen supply line provides a means of detecting such a failure and also triggers a warning device.

2. For the D(R and D) Series, a three-way control valve is installed in the pneumatic line. The emergency helium supply lines of the B and C Series have been removed for the D(R and D) Series launchers. The 7-08306 pressure switch functions as in the B and C launcher installations, described above in paragraph 2-4k, 1.

l. For the B and C Series, the emergency helium line incorporates a 7-08335 orifice to prevent excessive helium consumption in the event of a nitrogen line failure. This restriction device is necessary as the helium source supplies other critical locations.

2-5. AUXILIARY FRAME FUNCTION.

a. The auxiliary support frames (see figures 1-1 and 1-2) are designed to swing outward during missile rise-off to provide clearance and prevent contact in the event of missile drift. The two 7-08247 actuating cylinders are preloaded and perform this outward swing automatically as soon as the 7-49006 stabilizer pins are disengaged from the missile balance fitting sockets. Retraction pressure is 2000 psig for all series.

b. To prevent damage to the auxiliary support retraction cylinder, the outlet from the actuator is connected to the 7-08291 receiver through the 7-08292 restrictor check valve. These units bring the auxiliary support frame to a smooth stop as the auxiliary support retraction cylinder stroke is completed. To prevent rebound, the flow back to the cylinder is retarded by the 7-08292 restrictor check valve. The 7-08313 restrictors have the dual purpose of preventing back flow to the relief valve on the 7-08327 regulator during the auxiliary support frame motion

and insuring gradual application of source pressure during initial pressurization.

c. The 7-08327 regulator provides the correct pressure to attain full auxiliary support frame retraction while the built-in relief valve relieves pressure buildup due to retraction. This regulator normally supplies 1050 psig pressure for B and C Series and 875 psig for the D(R and D) Series; however, the system of 99-34003-001 manual vent valves and pressure valves provides means for over-riding this pressure through the 99-34975-001 shuttle valve. This over-riding function is necessary for ground handling purposes during missile erection and removal. Three 7-08276 hoses with quick disconnects, prevent inadvertent pressurization of the manual valves.

CAUTION

The 7-08276 hoses (red warning streamers attached) must be vented and removed before launching.

2-6. LIQUID NITROGEN FILL AND DUMP LINE, B AND C SERIES.

a. Each of the two liquid nitrogen dump valves, 99-34825-003, are controlled by a 99-35002-002 four-way, three-position, pneumatic solenoid valve. The 7-08295 regulator supplies 500 psig nitrogen to the solenoid valves. A 7-08301 restrictor is mounted prior to the 7-89220 control valve installation. This restrictor reduces any gaseous nitrogen surging, preventing possible damage to the liquid nitrogen dump valve. The liquid nitrogen first and second stage supply lines (1 1/2-inch OD tube at 25 psig) are supplied from the 7-08066 ground stubup via the 7-89003 and 7-89081 lines installation; see figures 2-2, 2-3, 2-4, and 2-5, line codes U-1 and U-2. The 99-35002-002 solenoid provides control for filling the liquid nitrogen system and for dumping prior to launch.

b. The propulsion control valve installation, mounted in Quad I of the launcher, provides the pressure source and regulation for control of the oxidizer and fuel fill drain valves; see figures 2-2, 2-3, 2-4, and 2-5. Check valves in the valve installation prevent movement of the control valves in the event of a loss of nitrogen supply pressure. From valve installation, lines are routed to disconnect panels and to oxidizer and fuel valves. For data on line nomenclature, codes, sizes, fluid types, and pressures, see figures 2-2, 2-3, 2-4, and 2-5.

2-7. LAUNCHER TO MISSILE SERVICE LINES.

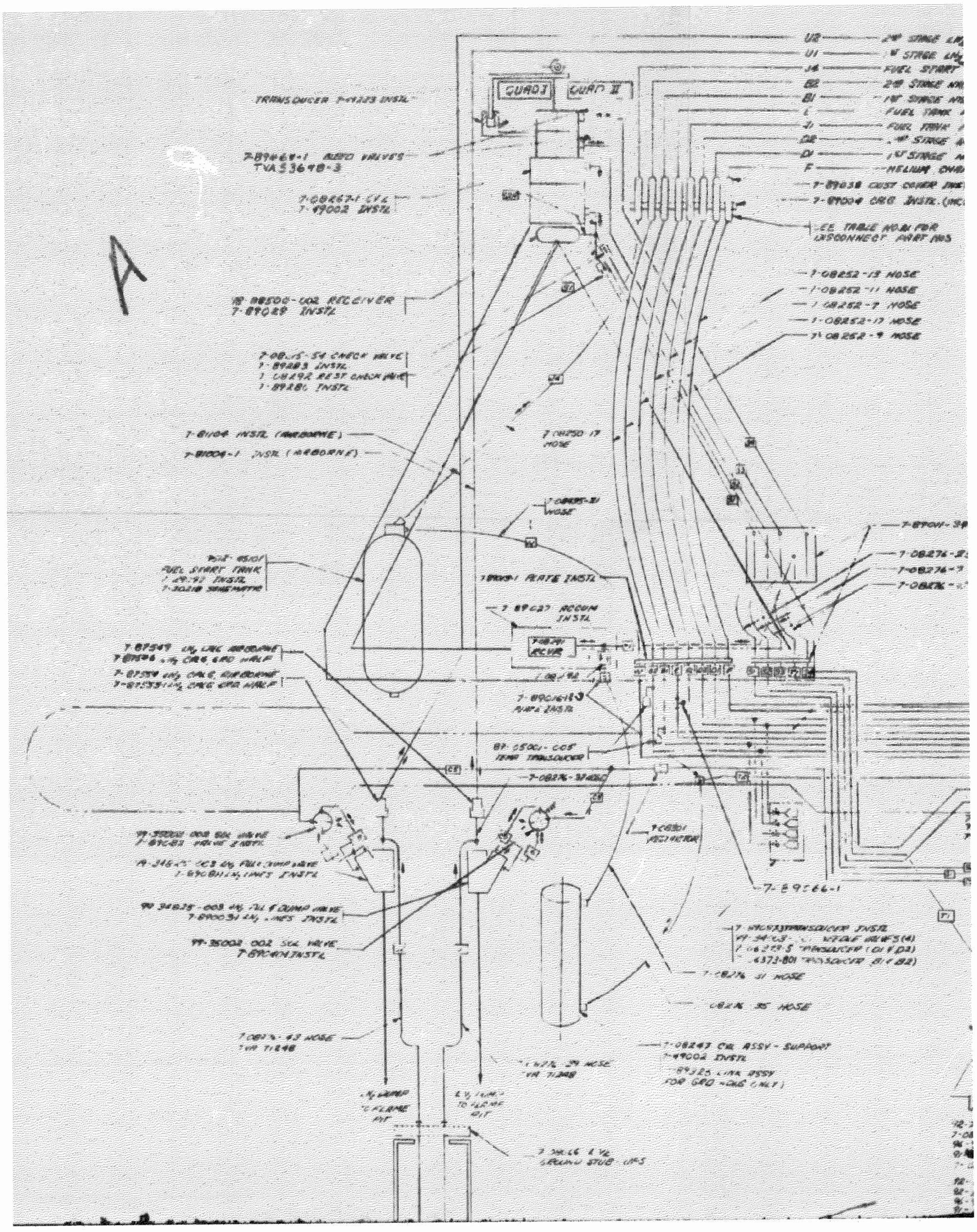
NOTE

See figures 2-2, 2-3, 2-4 and 2-5 for line data and rise-off disconnects.

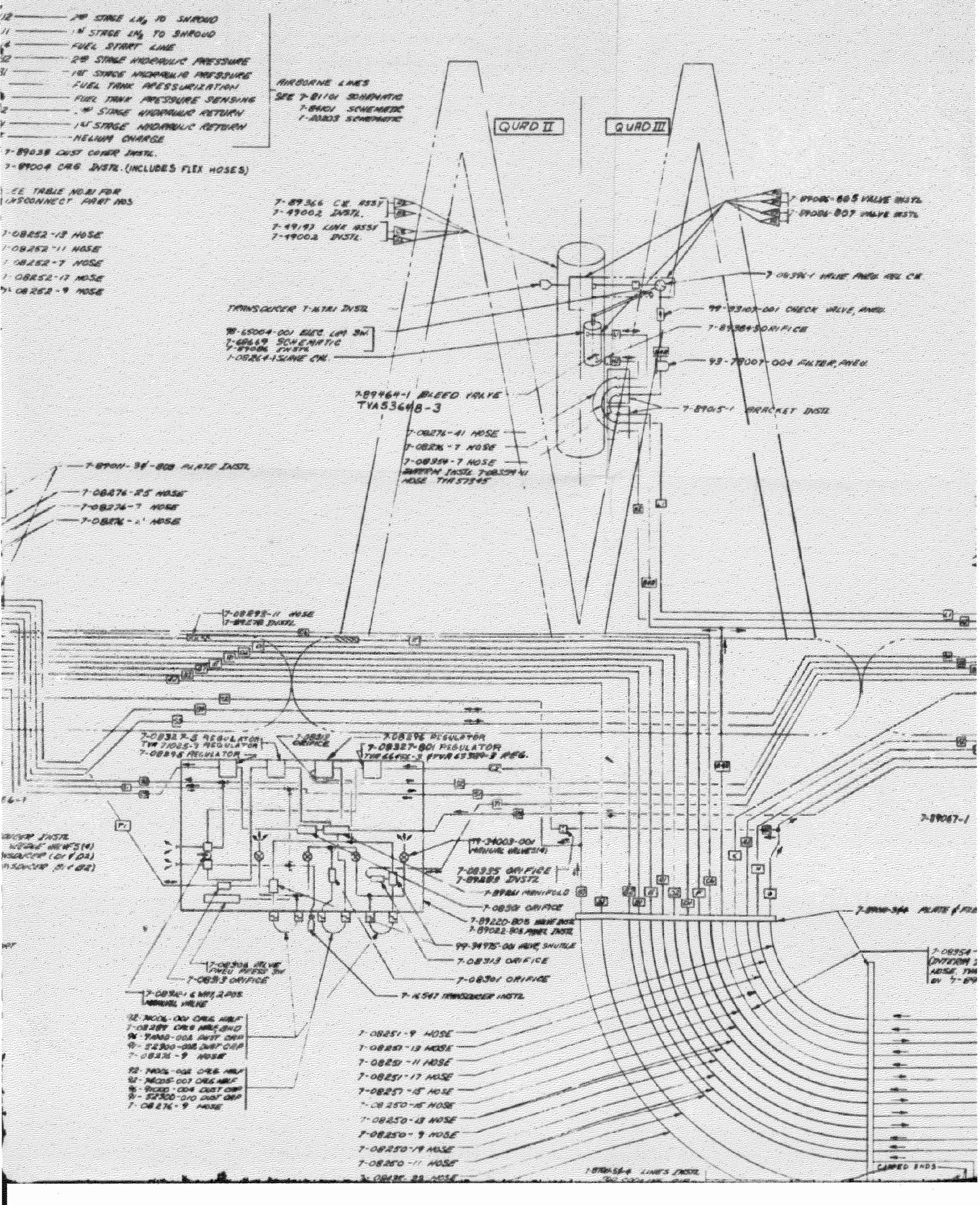
a. Service lines C6, A1, A2, E, and H pass from the stubups, through the 7-09224 relief valve unit (located next to the launcher in Quad III), to the rise-off disconnects via the launcher. The primary function of the 7-09224 relief valve unit is to prevent excessive pressure buildup in the missile tank pressurization system.

b. For B and C Series, a fuel start tank is mounted on the auxiliary support frame in Quad I and is pressurized to 2200 psig with gaseous nitrogen. The JP fuel travels from the tank through a flexible hose to the rise-off disconnects in Quad II; see figures 2-4 and 2-5, lines JJ and J4.

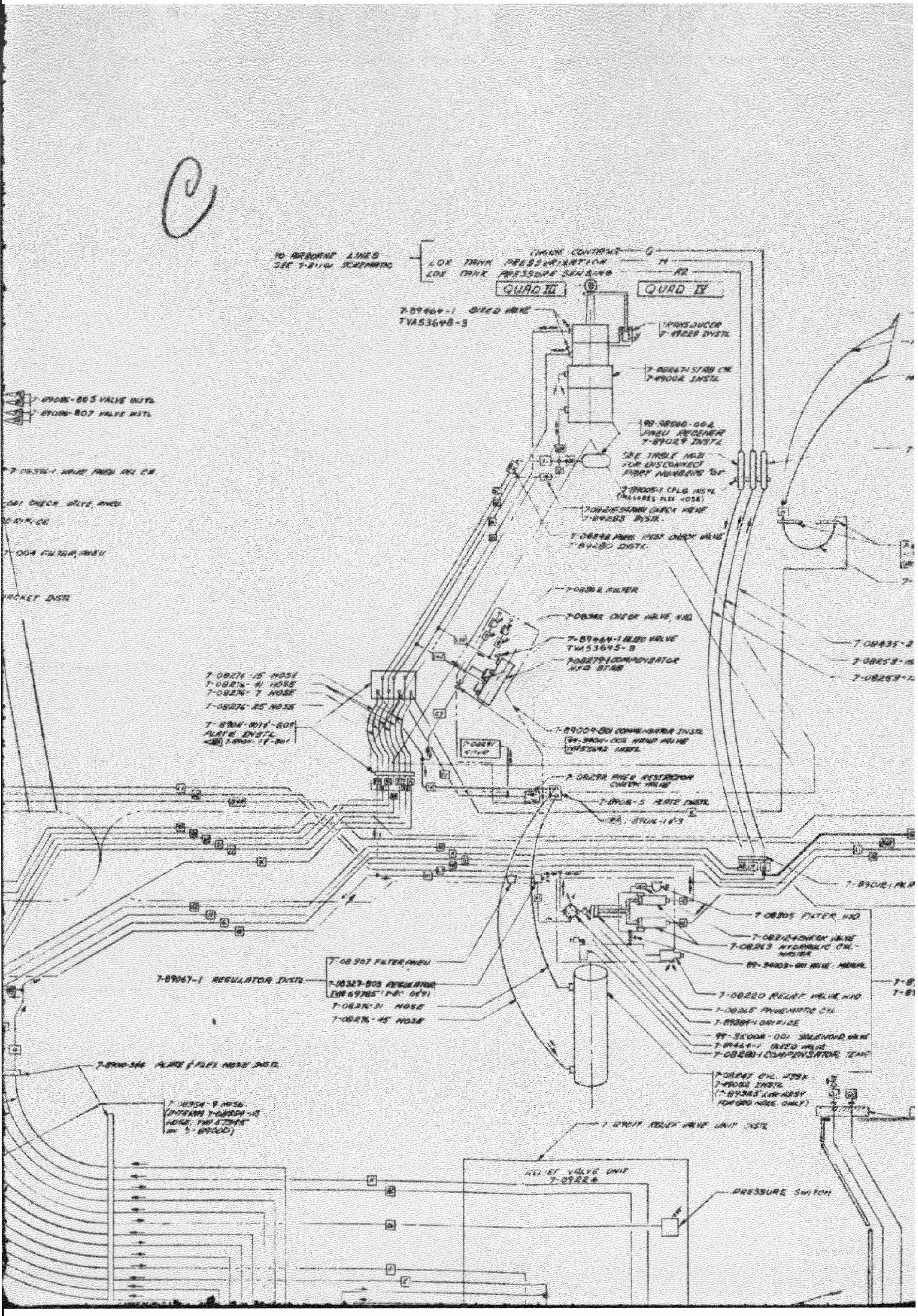
c. For B and C Series, the hydraulic reservoir pressurization lines must be manually


A
TRANSDUCER 7-89223 INSTL
QUAD I
QUAD II
7-89464-1 BLEED VALVES
TVA53648-3
7-89002 INSTL
7-89029 INSTL
7-89283 INSTL
7-81004 INSTL (AIRBORNE)
7-81004-1 INSTL (AIRBORNE)
FUEL START TANK
7-89027 ACCUM INSTL
7-89066-1
7-08276-31 HOSE
08276-35 HOSE
7-08247 CYL ASSY - SUPPORT
7-49002 INSTL
FOR GRD HDLG ONLY
U2
U1
J4
B2
B1
F
HELIUM CHA
FUEL START
7-89004 CRG INSTL
7-08252-13 HOSE
7-08252-11 HOSE
7-08252-7 HOSE
7-08252-17 HOSE
7-08252-9 HOSE

B

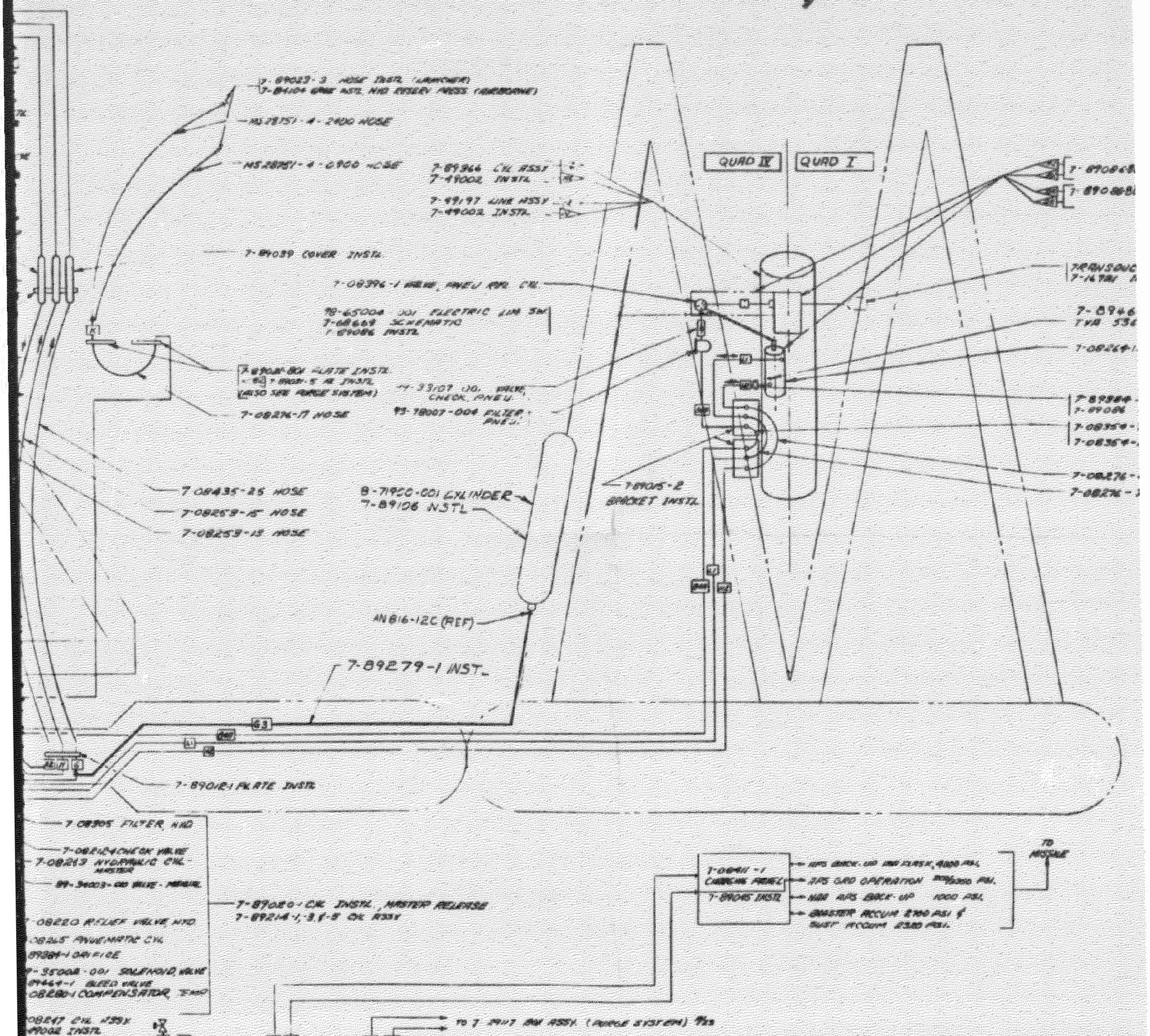


FUEL START LINE
FUEL TANK PRESSURIZATION
FUEL TANK PRESSURE SENSING
HELIUM CHARGE
AIRBORNE LINES
7-89004 CRG INSTL. (INCLUDES FLEX HOSES)
QUAD II
QUAD III
7-89366 CK ASSY
7-49002 INSTL.
7-49002 INSTL.
7-89086-805 VALVE INSTL.
7-89086-807 VALVE INSTL.
7-89464-1 BLEED VALVE
TVA53648-3
7-08276-41 HOSE
7-08354-7 HOSE
7-89015-1 BRACKET INSTL.
7-89364 ORIFICE
7-08296 REGULATOR
7-08327-801 REGULATOR
7-89067-1
7-08335 ORIFICE
7-08313 ORIFICE
7-08301 ORIFICE
7-08251-9 HOSE
7-08251-13 HOSE
7-08251-11 HOSE
7-08251-17 HOSE
7-08250-13 HOSE
7-08250-9 HOSE
7-08250-19 HOSE
7-08250-11 HOSE
CAPPED ENDS



TO AIRBORNE LINES SEE 7-8-101 SCHEMATIC
ENGINE CONTROL
LOX TANK PRESSURIZATION
LOX TANK PRESSURE SENSING
QUAD III
QUAD IV
7-89464-1 BLEED VALVE TVA53648-3
TRANSDUCER 7-49229 INSTL
7-89016-805 VALVE INSTL
7-89016-807 VALVE INSTL
SEE TABLE NO. 21 FOR DISCONNECT PART NUMBERS
7-08302 FILTER
7-08435-2
7-08276-15 HOSE
7-08276-11 HOSE
7-08276-7 HOSE
7-08276-25 HOSE
7-89009-801 COMPENSATOR INSTL
7-08292 PNEU RESTRICTOR CHECK VALVE
7-08305 FILTER HYD
7-08263 HYDRAULIC CYL-MASTER
7-08907 FILTER PNEU
7-89067-1 REGULATOR INSTL
7-08276-31 HOSE
7-08276-45 HOSE
7-08220 RELIEF VALVE HYD
7-08265 PNUEMATIC CYL
7-89381-1 ORIFICE
7-89464-1 BLEED VALVE
7-08280-1 COMPENSATOR
7-89017 RELIEF VALVE UNIT INSTL
RELIEF VALVE UNIT 7-09224
PRESSURE SWITCH

D



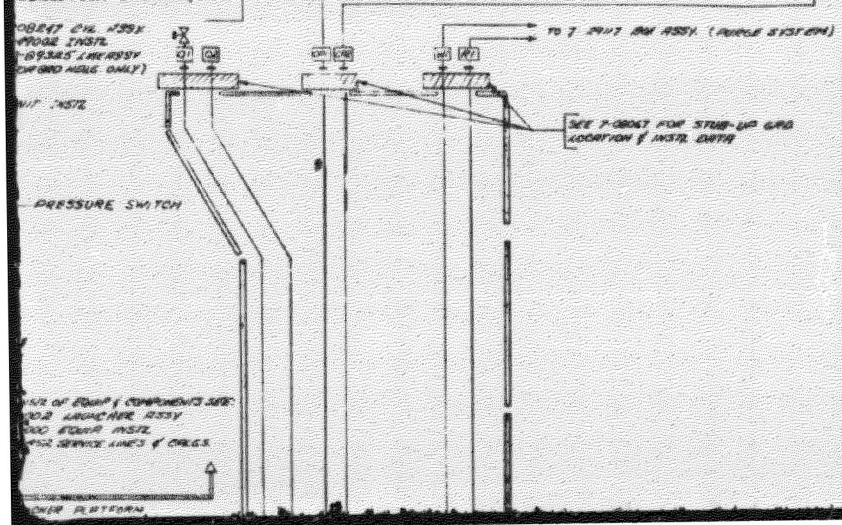


TABLE 23

LINE CODE	TUBE SIZE (IN) OD	TUBE SIZE (IN) WALL	TUBE MATERIAL	PRESSURE (PSI) OPERATING	PRESSURE (PSI) PROOF	TYPE FITTING	FLUID MEDIUM
R1	.50	.035	304 CRES	125	250	FLARELESS	HELIUM
R2	.50	.035		125	250		HELIUM
B1	.75	.049		3000	6000		MIL-O-5606
B2	.75	.049		3000	6000		MIL-O-5606
B3	.50	.065		2000	4000	FLARELESS	NITROGEN
B4R	.25	.078		6000	12000	[illegible]	NITROGEN
C1-3	1.00	.083		100	200	FLARELESS	[illegible]
C24	1.00	.083		100	200		[illegible]
C5	.25	.035		500	1000		[illegible]
C6	.50	.065		3000	6000		HELIUM
C7	.25	.035		2000	4000		NITROGEN
D1	1.50	.065		150	300		MIL-O-5606
D2	1.50	.065		150	300	FLARELESS	MIL-O-5606
E	2.50	.065		125	250	MARMAN	HELIUM
F	1.00	.083		3000	6000	FLARELESS	
G	.375	.035		2200	4400	FLARELESS	
G2	.375	.035		2200	4400	FLARELESS	
H	2.75	.065		125	250	MARMAN	HELIUM
H1	.50	.065		2000	4000	FLARELESS	NITROGEN
H2	.50	.065		4000	8000	FLARELESS	MIL-O-5606
J4	2.50	.065		1600	3200	FLARED	JP4 FUEL
JJ	1.50	.065		2200	4400	FLARED	NITROGEN
K	.25	.035		125	250	FLARELESS	HELIUM
K1	.375	.035		125	250	FLARELESS	HELIUM
L1	.25	.035		2000	4000	FLARELESS	NITROGEN
P1	2.50	.065		125	250	MARMAN	HELIUM
P2	2.75	.065		125	250	MARMAN	
P3	1.25	.065		125	250	FLARELESS	
P4	2.75	.065		125	250	MARMAN	HELIUM

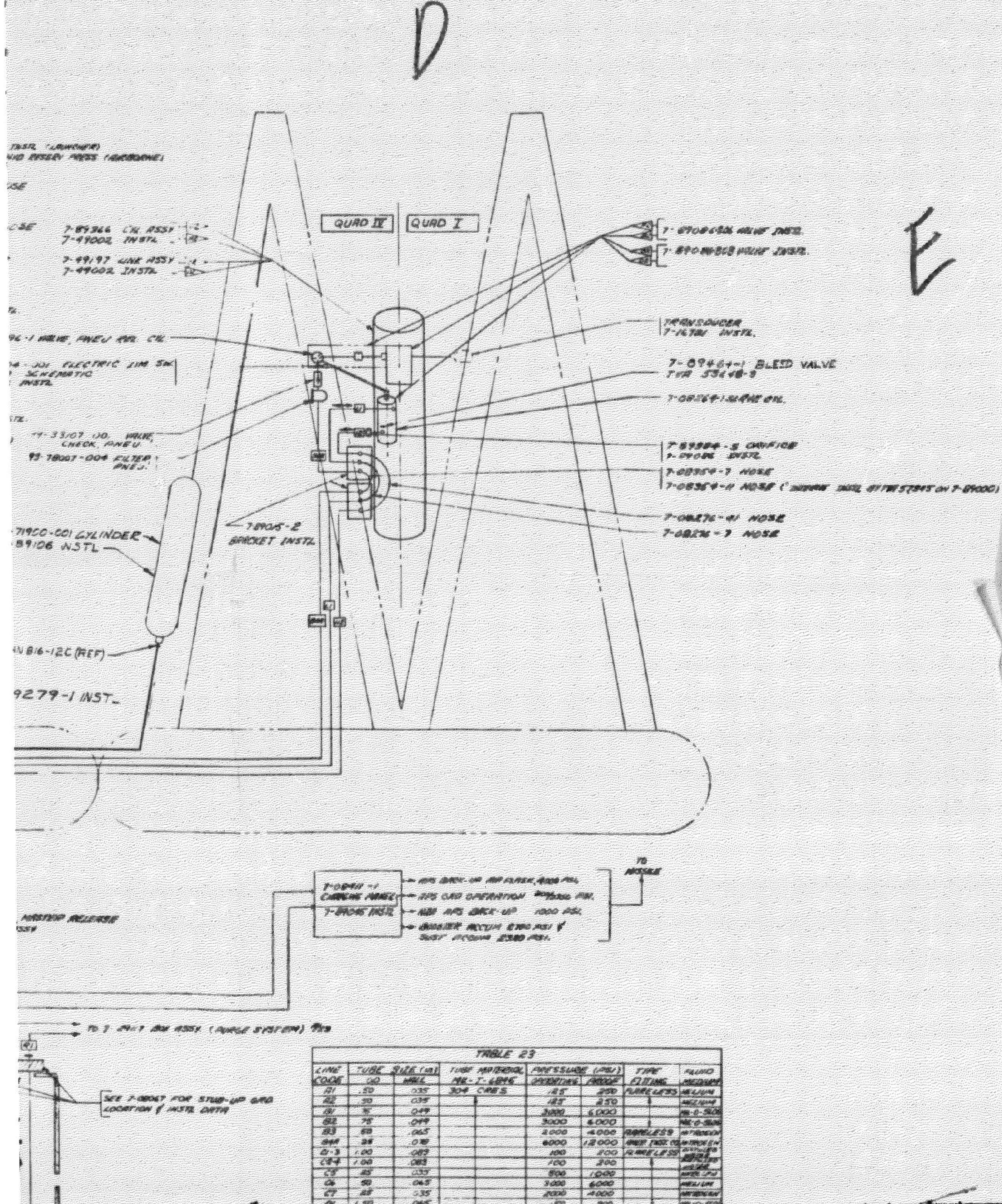
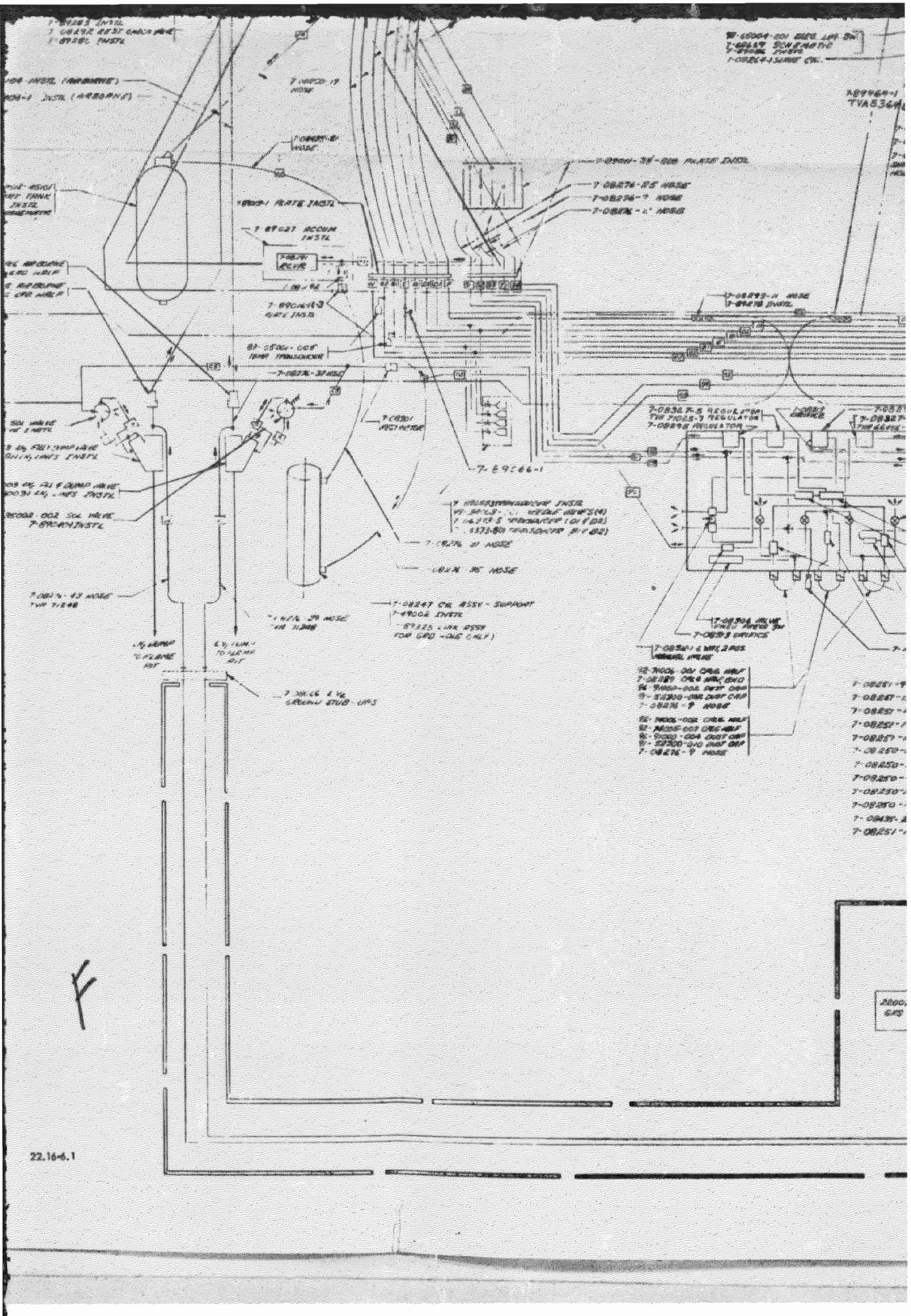
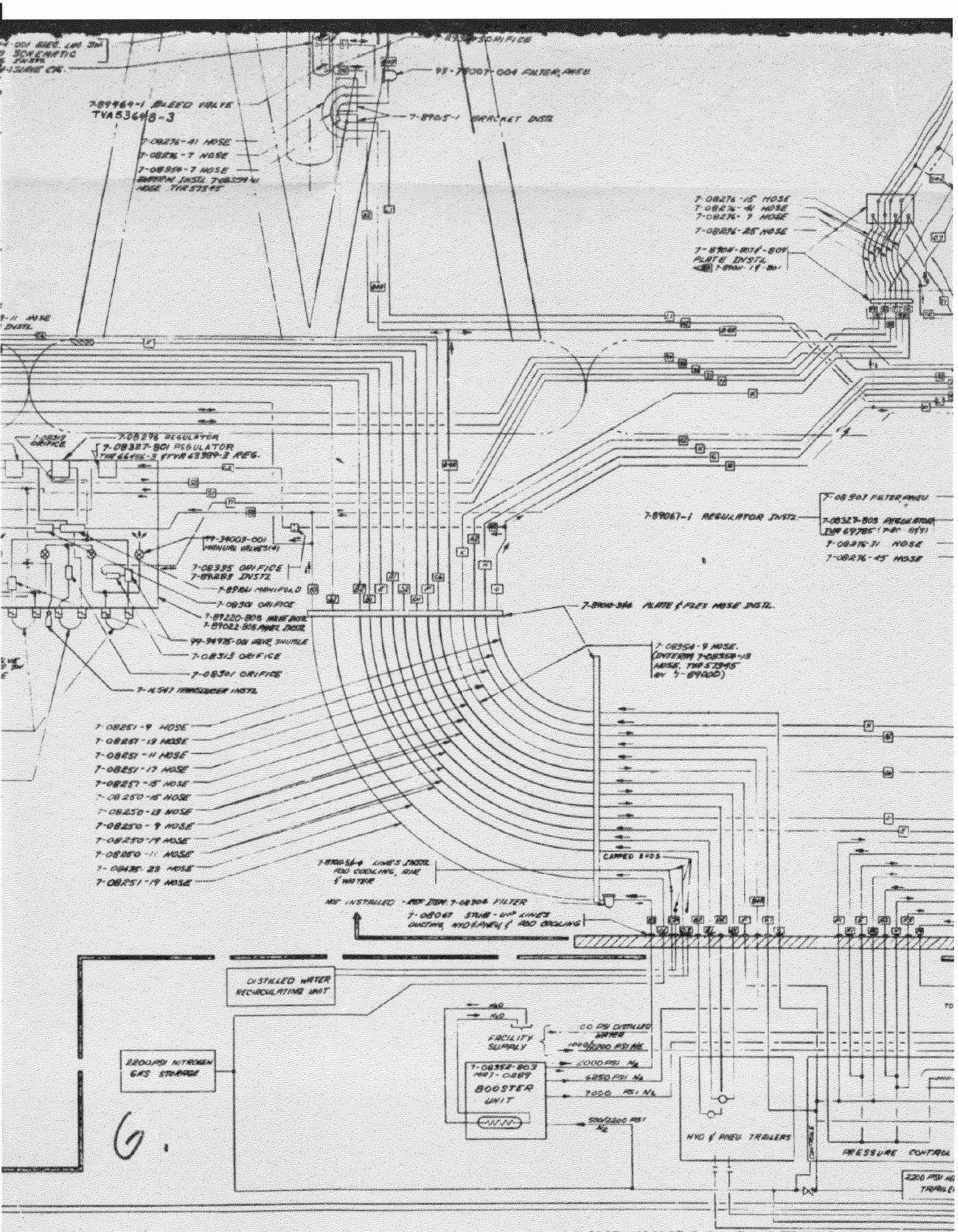
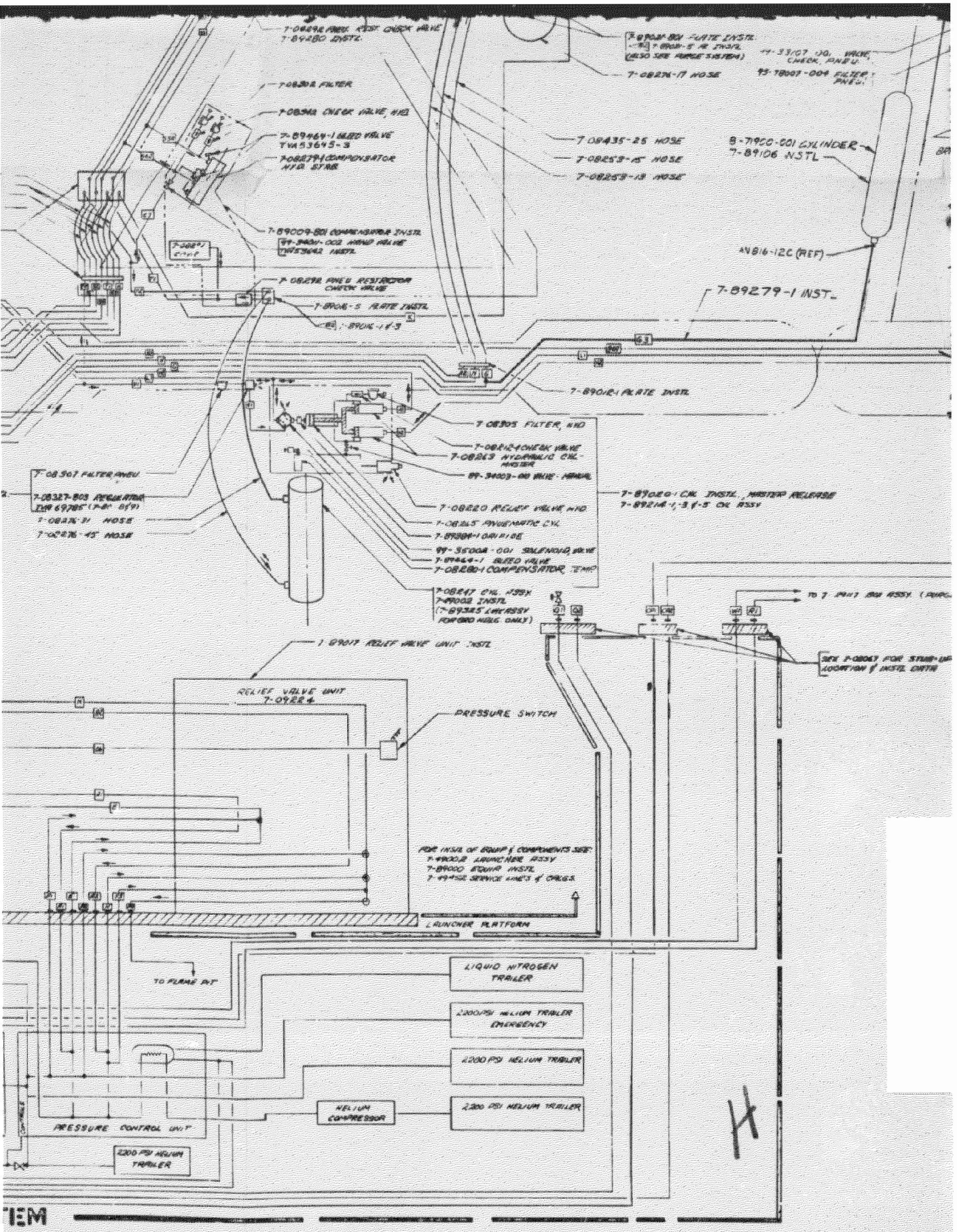


TABLE 23							
LINE CODE	TUBE SIZE (IN) OD	WALL	TUBE MATERIAL MIL-T-6845	PRESSURE (PSI) OPERATING	PROOF	TYPE FITTING	FLUID MEDIUM
A1	.50	.035	304 CRES	125	250	FLARELESS	HELIUM
A2	.50	.035		125	250		HELIUM
B1	.75	.049		3000	6000		MIL-O-5606
B2	.75	.049		3000	6000		MIL-O-5606
B3	.50	.065		2000	4000	FLARELESS	NITROGEN
B4H	.25	.018		6000	12000	[illegible]	NITROGEN
C1-3	1.00	.083		100	200	FLARELESS	[illegible]
C4	1.00	.083		100	200		[illegible]
C5	.25	.035		500	1000		[illegible]
C6	.50	.045		3000	6000		HELIUM
C7	.25	.035		2000	4000		NITROGEN
D1	1.50	.065		150	300		MIL-O-5606



22.16-6.1


7-89964-1 BLEED VALVE
TVA53648-3
7-08276-41 HOSE
7-08276-7 HOSE
7-08276-7 HOSE
7-08276-15 HOSE
7-08276-41 HOSE
7-08276-7 HOSE
7-08276-25 HOSE
7-08276 REGULATOR
7-08327-801 REGULATOR
7-08395 ORIFICE
7-89288 INSTL
7-08901 ORIFICE
7-08313 ORIFICE
7-08301 ORIFICE
7-08251-9 HOSE
7-08251-13 HOSE
7-08251-11 HOSE
7-08251-17 HOSE
7-08251-15 HOSE
7-08250-13 HOSE
7-08250-9 HOSE
7-08250-19 HOSE
7-08250-11 HOSE
7-08251-23 HOSE
7-08251-19 HOSE
7-89067-1 REGULATOR INSTL
7-08907 FILTER ANEU
7-08327-803 REGULATOR
7-08276-31 HOSE
7-08276-45 HOSE
7-89010-3/4 PLATE & FLEX HOSE INSTL.
7-08354-9 HOSE.
CAPPED ENDS
7-08067 STUB-UP LINES
DUCTING, HYD & PNEU & AOD COOLING
DISTILLED WATER
RECIRCULATING UNIT
FACILITY
SUPPLY
2200 PSI NITROGEN
GAS STORAGE
7-08352-803
MOD-0289
BOOSTER
UNIT
HYD & PNEU TRAILERS
PRESSURE CONTROL
6.
GRD. PRESS. SYSTEM



ITEM

1

ISSUED

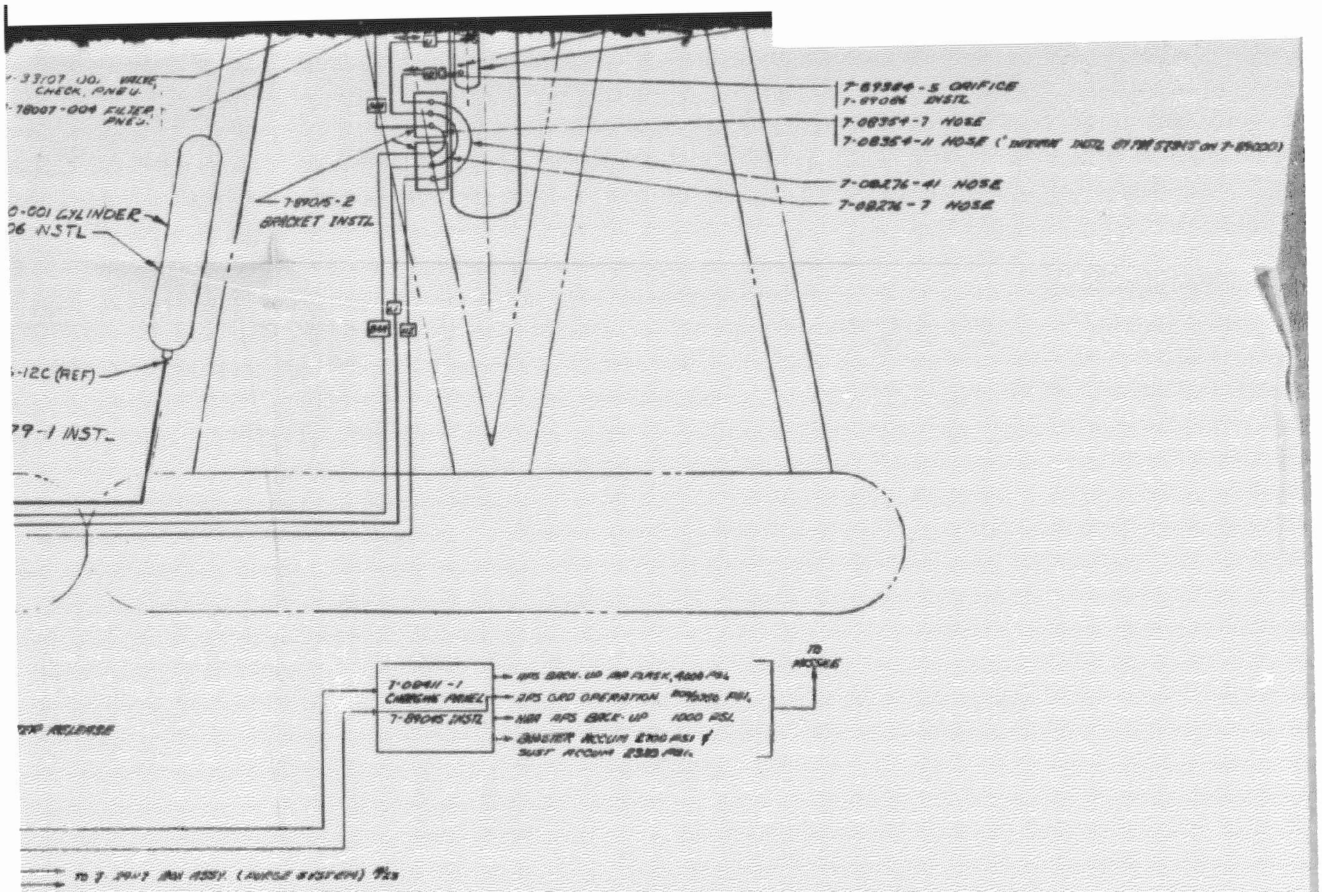


TABLE 23							
LINE CODE	TUBE SIZE (IN.) OD	WALL	TUBE MATERIAL MIL-T-6845	PRESSURE (PSIG) OPERATING	PROOF	TYPE FITTING	FLUID MEDIUM
R1	.50	.035	304 CRES	125	250	FLARELESS	HELIUM
R2	.50	.035		125	250		HELIUM
B1	.5	.049		3000	6000		[illegible]
B2	.75	.049		3000	6000		[illegible]
B3	.50	.065		2000	4000	FLARELESS	NITROGEN
B4	.25	.035		6000	12000	[illegible]	NITROGEN
C-3	1.00	.083		100	200	FLARELESS	NITROGEN
C-4	1.00	.083		100	200		[illegible]
C5	.25	.035		500	1000		[illegible]
C6	.50	.065		3000	6000		HELIUM
C7	.25	.035		2000	4000		NITROGEN
D1	1.50	.065		150	300		[illegible]
D2	1.50	.065		150	300	FLARELESS	[illegible]
E	2.50	.065		125	250	MARMAN	HELIUM
F	1.00	.083		3000	6000	FLARELESS	
G	.375	.035		2200	4400	FLARELESS	
G2	.375	.035		2200	4400	FLARELESS	
H	2.75	.065		125	250	MARMAN	HELIUM
H1	.50	.065		2000	4000	FLARELESS	NITROGEN
H2	.50	.065		4000	8000	FLARELESS	[illegible]
J1	2.50	.065		1000	2000	FLARED	[illegible]
J2	1.50	.065		2200	4400	FLARED	HELIUM
K	.25	.035		125	250	FLARELESS	HELIUM
K1	.375	.035		125	250	FLARELESS	HELIUM
L1	.25	.035		2000	4000	FLARELESS	NITROGEN
P1	4.50	.065		125	250	MARMAN	HELIUM
P2	2.75	.065		125	250	MARMAN	
P3	1.25	.065		125	250	FLARELESS	
P4	2.75	.065		125	250	MARMAN	HELIUM
Q1	.75	.049		2000	4000	FLARELESS	[illegible]
Q2	.75	.049		2000	4000	FLARELESS	[illegible]
T1	.25	.035		1000	2000	FLARELESS	NITROGEN
T2	.50	.065	304 CRES	2000	4000	FLARELESS	NITROGEN
U1	1.50	.065	304 321 or 347	25	50	MARMAN	[illegible]
U2	1.50	.065	304 321 or 347	25	50	MARMAN	[illegible]
CP1	[illegible]	[illegible]	304 CRES	7000	14000	BRAZED	NITROGEN
CP2	.50	.035		2200	4400	FLARELESS	HELIUM
[illegible]	.50	.065		1200	2400		[illegible]
[illegible]	.25	.035		4000	8000		[illegible]
[illegible]	.25	.035		4000	8000		[illegible]
S1	.50	.035		1200	2400		NITROGEN
S2	.25	.035		1100	2200		HELIUM
S3	.50	.065		4000	8000		[illegible]
S4	.50	.065	304 CRES	4000	8000	FLARELESS	[illegible]
G3	.75	.049	304 CRES	2200	4400	FLARED	HELIUM

Figure 2-2. Schematic Diagram, Hydraulic and Pneumatic Lines, Launcher Systems (7-89100), B and C Series (Sheet 1 of 2)

A

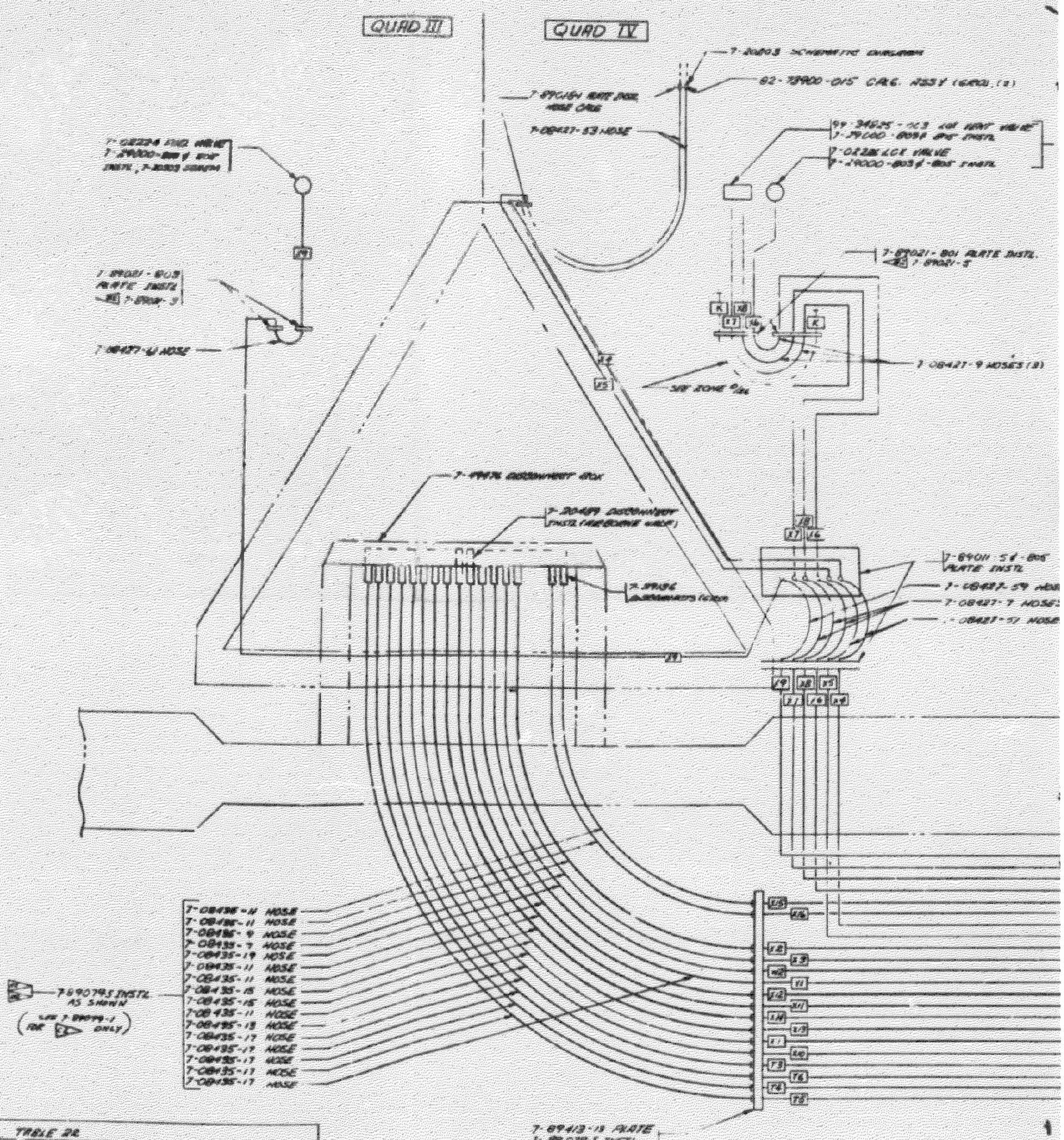


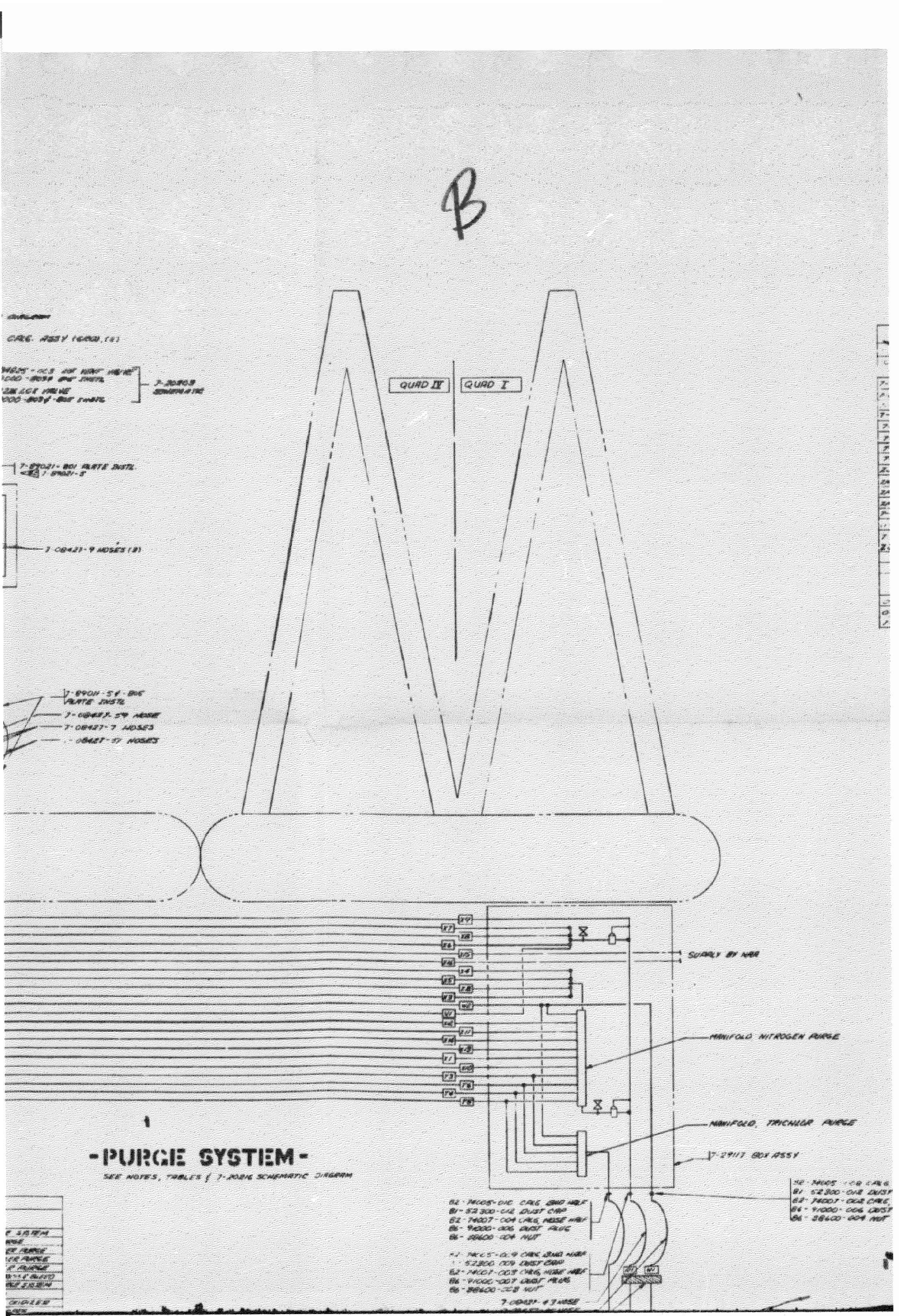
TABLE 22

NO. FROM INSTL NO.	LINE CODE	DESCRIPTION
7-89272-1	JJ	FUEL START LAUNCHER
7-89274	B1, D1	MISSILE HYD 1ST STAGE, LAUNCHER
7-89274-1	B2, D2	MISSILE HYD 2ND STAGE, LAUNCHER
7-89275	M, N, P2, P3, P4	LOX TANK PRESSURIZATION, LAUNCHER
7-89276	N, E, P1	FUEL TANK PRESSURIZATION LAUNCHER
7-89277	K, K1	HYD AND PRS PRESS, LAUNCHER
7-89278	G6, F	VALVE HELIUM CHARGE, LAUNCHER
7-89279-1	G, G3	MISSILE ENGINE CONTROL, LAUNCHER
7-89280	[illegible]	PNEUMATIC ACTUATION, LAUNCHER
7-89281	[illegible]	HYDRAULIC ACT STOR, LAUNCHER
7-89282	C5, C7	[illegible] ACTUATING [illegible] LAUNCHER
7-89283	[illegible]	[illegible]

TABLE 25; PURGE SYSTEM LINES

LINE CODE	TUBING SIZE (IN) O.D.	WALL	TUBE MATERIAL AN-F LINES	PRESSURE PSI OPERATING	PRESSURE PSI PROOF	TYPE FITTING	FLUID MEDIUM	LINE FUNCTION
A1	.100	.083	304 CRES	2250	4500	MS	GN2	GN2 SUPPLY TO PURGE SYSTEM
T9	.50	.035	[illegible]	500	1000	[illegible]	GN2/GN2	DISTRIBUTE FUEL PURGE
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

B



-PURGE SYSTEM-

SEE NOTES, TABLES & 7-20816 SCHEMATIC DIAGRAM

C

REVISIONS						
EFF ON	INCORP	SYM	DESCRIPTION	ZONE	DATE	APPR

TABLE 24

LIST OF TECH REPORTS, SCHEMATICS, & SPECS ASSOCIATED WITH LAUNCHER OPERATION

CONVAIR NO.	TITLE
7-89007	SCHEMATIC DIAG. - LAUNCHER RELEASE SYSTEM - ATHTE
7-89019	" - LAUNCHER RELEASE SYSTEM - ERB
7-89044	" - LAUNCHER RELEASE SYSTEM - [illegible]
7-84101	" - NHD SYSTEM (AIRBORNE)
7-84161	" - PRESSURIZATION SYSTEM (AIRBORNE)
7-89001	" - GRD SUPPORT PRESSURIZATION SYSTEM
7-89049	" - PNEU BOOSTER UNIT
7-08003	SCHEMATIC DIAG. - PRESSURIZATION SYSTEM - ERB 1-4 STAND
ZA-7-049	REPORT - FUNCTIONAL TEST & BLEED (SHAKEDOWN) PROCEDURE, LAUNCHER
ZA-7-418	REPORT - LEAK TEST PROCEDURE - LAUNCHER TUBING ASSYS
ZA-7-196	REPORT - PRELIMINARY OPERATING & MAINTENANCE INSTRUCTIONS, LAUNCHER ASSY.
ZA-7-516	REPORT - PRELIMINARY OPERATING INSTRUCTIONS - PNEU & NHD SYSTEM, LAUNCHER
7-49452	SERVICE LINES & COUPLING ASSYS - LAUNCHER
0-15010	REPORT - FLARELESS TUBE FITTINGS ASSY & INSTL.
7-20218	SCHEMATIC DIAG. - FUEL START
ZA-7-998	PRELIMINARY OPR & MAINTENANCE INSTRUCTIONS FOR LNCHR PNEU BOOSTER UNIT "A" SERIES
0-75001	REPORT - CLEAN & RECHECK PROCEDURE FOR FUEL SYSTEM COMPONENTS
0-75002	REPORT - CLEAN & RECHECK PROCEDURE FOR LOX SYSTEM COMPONENTS
7-10803	SCHEMATIC DIAGRAM - PROPULSION SYSTEM (AIRBORNE)

ITROGEN PURGE

TRICHLOR PURGE

ASSY

82 - 74005 - [illegible] CPLG. END HALF
81 - 52300 - 012 DUST CAP
82 - 74001 - 002 CPLG. HOSE HALF
84 - 91000 - 006 DUST PLUG
86 - 28600 - 004 NUT

ON OF FITTINGS (SEE TABLES 23 & 25):
ESS MS 21900 SERIES (CRES).
N PRODUCTS CO, INC, CAT J-11 SERIES
FITTINGS USING COPPER (NICKEL PLATED) GASKETS
N INSTRUMENT CO. SUPER PRESSURE CRES FITTINGS
E (CAT 42 & F427).
NBC SERIES (CRES).
STEM NOT INSTALLED ON 7-31-10 (AT LAMA)
ATION TO LOX & FUEL ARE PER 7-31-10 TO BE PER
CONFIGURATION ON 7 89100-1.

89-06001-008	TEMP TRANSDUCER	1472	TRANS-SONICS CORP	C/14
MS28751-4-2400	HOSE - RUBBER	———	———	[illegible]
MS28751-4-0900	HOSE - RUBBER	———	———	[illegible]
7-08411-1	CHARGING PANEL	890400	ACCESSORY PROD CORP	[illegible]
7-08267-1	CYL - STABILIZER	4097	HASKEL - LOUD MACHINE WORKS	[illegible]
7-08265	CYL - PNEU	D-50682	J.C. PEACOCK	[illegible]
7-08264-1	CYL - SLAVE	D-50684	J.C. PEACOCK	[illegible]
7-08263	CYL - MASTER	D-50688	J.C. PEACOCK	[illegible]
7-08247	CYL - SUPPORT	7815	HASKEL - LOUD MACHINE WORKS	[illegible]
7-89366	CYL (HOLD DOWN) ASSY	———	BRUST TOOL CO.	[illegible]
7-06373-801	TRANSDUCER			4/29
7-06373-5	TRANSDUCER			4/29
81-71900-001	CYL - COMPRESSED GAS			C/26
98-88500-002	RECEIVER - PNEU	840312 OR 840553	WALTER KIDDE CO.	[illegible]
7-08291	RECEIVER - PNEU	HV0523 OR 851200	BENDIX AVIATION CORP	[illegible]
7-08280-1	COMP - NHD MASTER	2253-1	INTERSTATE ENGR CORP	C/27
7-08279-1	COMP NHD SLAVE	2252-1	INTERSTATE ENGR CORP	C/31
7-89384-5	ORIFICE - PNEU			[illegible]
7-89384-1	ORIFICE - PNEU			8/27
7-08395	ORIFICE - PNEU	2R 1063	GAR PRECISION PROD. CO.	[illegible]
7-08313	ORIFICE - PNEU	2R 1063 - 015	GAR PRECISION PROD. CO.	[illegible]
7-08301	ORIFICE - PNEU	R-60052	VINSON MFG. CO.	[illegible]
97-78007-004	FILTER - PNEU	FH2-30	PRESSURE PRODUCTS	[illegible]
7-08307	FILTER - PNEU	10035-3000	PERMANENT FILTER CORP	[illegible]
7-08305	FILTER - NHD	5968K	AEROLATOR PROD. CO.	[illegible]

D

REVISIONS									
EFF ON	INCORP	SYM	DESCRIPTION	ZONE	DATE	APPROVAL			
			WITH C/C 26953, SCF 2 THRU 16 & 22. DISP-NONE (REF DWG) J.L. Tayeda 2/4/58 [illegible] F.C. Cravans [illegible] 2/4/58		[illegible]	[illegible]			

EFF ON	INCORP	SYM	DESCRIPTION	ZONE	DATE	APPROVAL
AWO		A	ADD 7-89279-1, 89-71800-801	C-26		
78208			7-89108, G3 LINE 37-7-098	C-28	8-32	
EWO			7-89048-1; 7-08327-5 TO TVA	C-28		
070800			71028-7; 7-08327-801 TO TVA'S	C-28		
73410			633895 &61838; 7-89464-1	C-31	8-32	
780-57 [illegible]			TO TVA 53648-3, 7-08267-1 WAS	C-32		
			BASIC; 7-89016-16-3 WAS -2; 7-	C-89		
			89087-3 WAS -1; 7-08379-5 WAS	C-89		
			-1; 7-08373-801 WAS -3; 7-	C-89		
			08267-1 WAS BASIC; 7-89086	C-32		
			-805, -806, -807, -808 WAS -1,-2,-3,-4	C-32		
			7-87011-3 WAS -2; 7-89220-805	C-32	8-28	
			WAS -1; 7-89022-805 WAS BASIC;	C-89		
			7-89087-1 WAS BASIC; 7-08327	C-32		
			-803 WAS 7-08327-1 (TVA69786)			
			CAPPED ENDS ON C&S [illegible] LINES	A-89		
			7-89005-1 WAS BASIC; 7-08279-1	C-32		
			WAS BASIC; 7-89009-801 WAS -3;	C-89		
			7-08435-25 WAS 7-08263-11;	C-26		
			7-89012-1 WAS BASIC; 7-89279-1	C-26		
			WAS BASIC. USE CONCURRENT	C-26		

Part No.	Description	Vendor Part No.	Vendor	Remarks	Date	
7-08327-5	VALVE - PRESS REG		ACCESSORY PRODUCTS CORP TVA 71025-7		C/28	
99-34003-001	VALVE - SHUT-OFF, HAND	1900PH-FF6 - 1/8	JAS. P. MARSH CO.		8/28	
99-35002-005	VALVE - SOL.	MV531-801834	SOUTHWESTERN VALVE		C/29	
99-34025-003	VALVE - PRESS OPR.	208643-1	SOUTHWESTERN VALVE		C/29	8/28
99-34975-001	VALVE - SHUTTLE	4579-4888	JAMES POND CLARK		8/28	
99-35002-001	VALVE - SOL	MV531-800734	SOUTHWESTERN VALVE		C/27	
99-33107-001	VALVE - CHECK, HYDR	41-6304	AMERICAN INST. CO.		8/26	8/28
7-09224	RELIEF VALVE UNIT	301-2000	ROBERT SHAW FULTON		8/27	
7-08396-1	VALVE - PRES REG. CK.	C687	[illegible]		8/26	8/28
7-08342	VALVE - CHECK - AIR	4EV043	G.R. PRECISION PROD. CO.		8/27	
7-08327-801	VALVE - PRESS REG.		ACCESSORY PROD. CORP	TVA 63889-3 TVA 63888-3	C/28	
7-08327-803	VALVE - PRESS REG.		WESTON HYD. LTD.	TVA 69786	8/27	
7-08312	VALVE - EMER. & PRES.	10-1455-6	[illegible] MFG. CO.		8/26	
7-08306	VALVE - PRESS. PRESS. SH.	95700	AIR RESEARCH & MFG.		8/26	
7-89464-1	VALVE - BLEED, HYDRAULIC			TVA 52648-3	C/27	[illegible]
7-08296	VALVE - PRESS. REG.	108600	ACCESSORY PROD.		C/28	
7-08295	VALVE - PRESS REG.	108500	ACCESSORY PROD.		C/28	
7-08298	VALVE - RESTRICTOR CHECK	[illegible]-0135	G.R. PRECISION PROD. CO.		8/27	[illegible]
7-08220	VALVE - AIR RELIEF	A-50156	WESON MFG. CO.		8/27	
7-08215-56	VALVE - CHECK, AIR	[illegible]	JAMES POND CLARK		8/27	8/27
7-08218-4	VALVE - CHECK, AIR	———	PARKER AIRCRAFT		8/27	
7-08427-61	HOSE - METAL				8/25	
-59					C/26	
-53					C/26	
-51					8/28	
-45					8/26	
-43					8/26	
-9					8/26	8/27
7-08427-7	HOSE - METAL				C/26	
7-08427-17 20-41	-47 -49 -55 & -57 HOSE - METAL (FOR 7-80-6 ONLY, SEE 7-89079-1)					
7-08435-23	HOSE (TEFLON LINED) (METAL BRAID) ASBESTOS SHIELDING				8/26	
-21					8/27	
-19					8/26	
-17						
-15						
-13						
-11						
-9						
7-08435-7	HOSE (TEFLON LINED, METAL BRAID, ASBESTOS SHIELDING)				8/26	
7-08435-25	" " " "				C/26	
7-08354-13	HOSE - METAL	103481	FLEXONICS	TVA 57345	8/27	
-11		103480	FLEXONICS	TVA 57345	8/26	8/28
-9		104494			8/27	
7-08364-7		104493			8/26	8/28
7-08373-11		103168	FLEXONICS		8/28	
7-08276-45					8/27	
-43					8/29	
-41		104123	FLEXONICS		8/26	8/27 8/28 8/29
-39		206-4570-39	DUNBAR KAPPLE		8/29	
-37		206-4505-37	DUNBAR KAPPLE		8/29	
-35		NS295-35	FLEX METAL HOSE		8/29	
-3		104119	FLEXONICS		8/27	8/29
-25		NS295-27	FLEX METAL HOSE		8/27	8/29
-15		203-4815-15	DUNBAR KAPPLE		8/27	
-9		NS295-19	FLEX METAL HOSE			8/29
7-08276-7		NS295-17	FLEX METAL HOSE		8/26	8/27 8/28 8/29
7-08253-15		206-3950-15	DUNBAR KAPPLE		8/26	
7-08253-13		203-4710-13	DUNBAR KAPPLE		8/26	
7-08374-17		203-4815-17	DUNBAR KAPPLE		8/26	
7-08252-17		206-3940-17	DUNBAR KAPPLE		8/29	
-13		104107	FLEXONICS		8/29	
-11		206-3940-11	DUNBAR KAPPLE		8/29	
-9		104106	[illegible]			

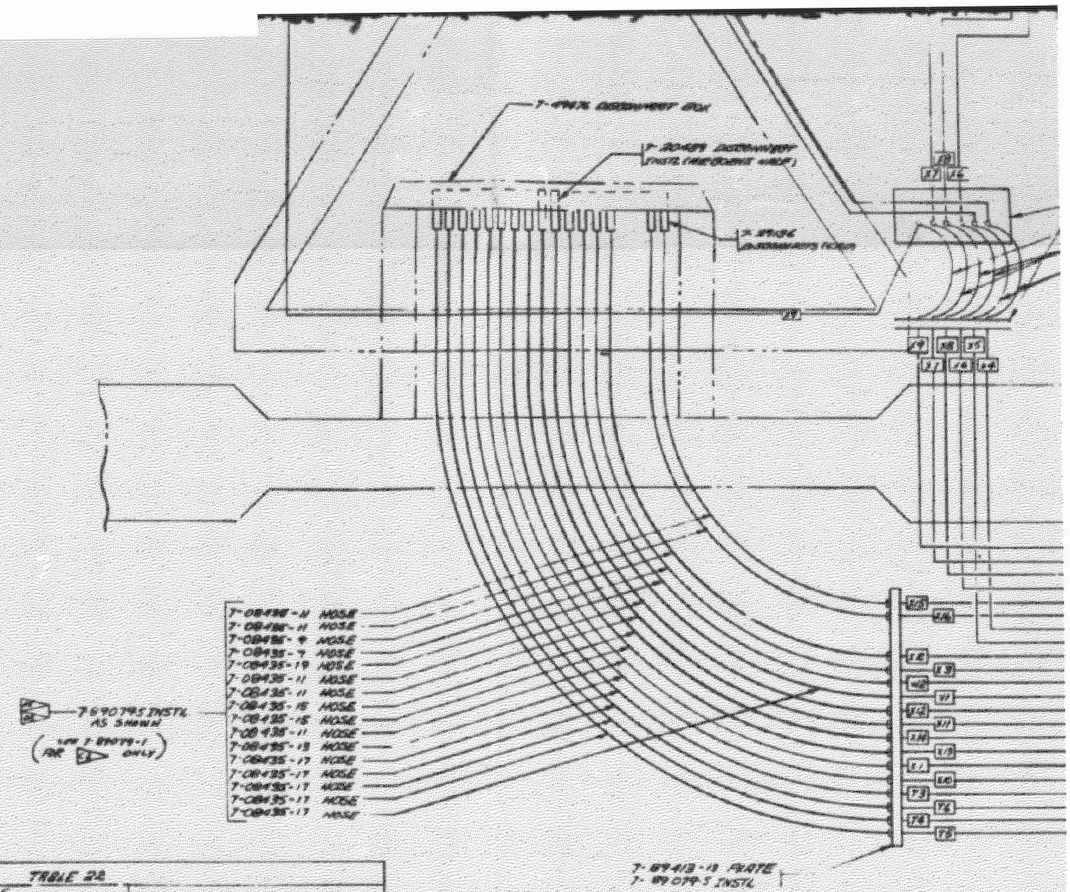


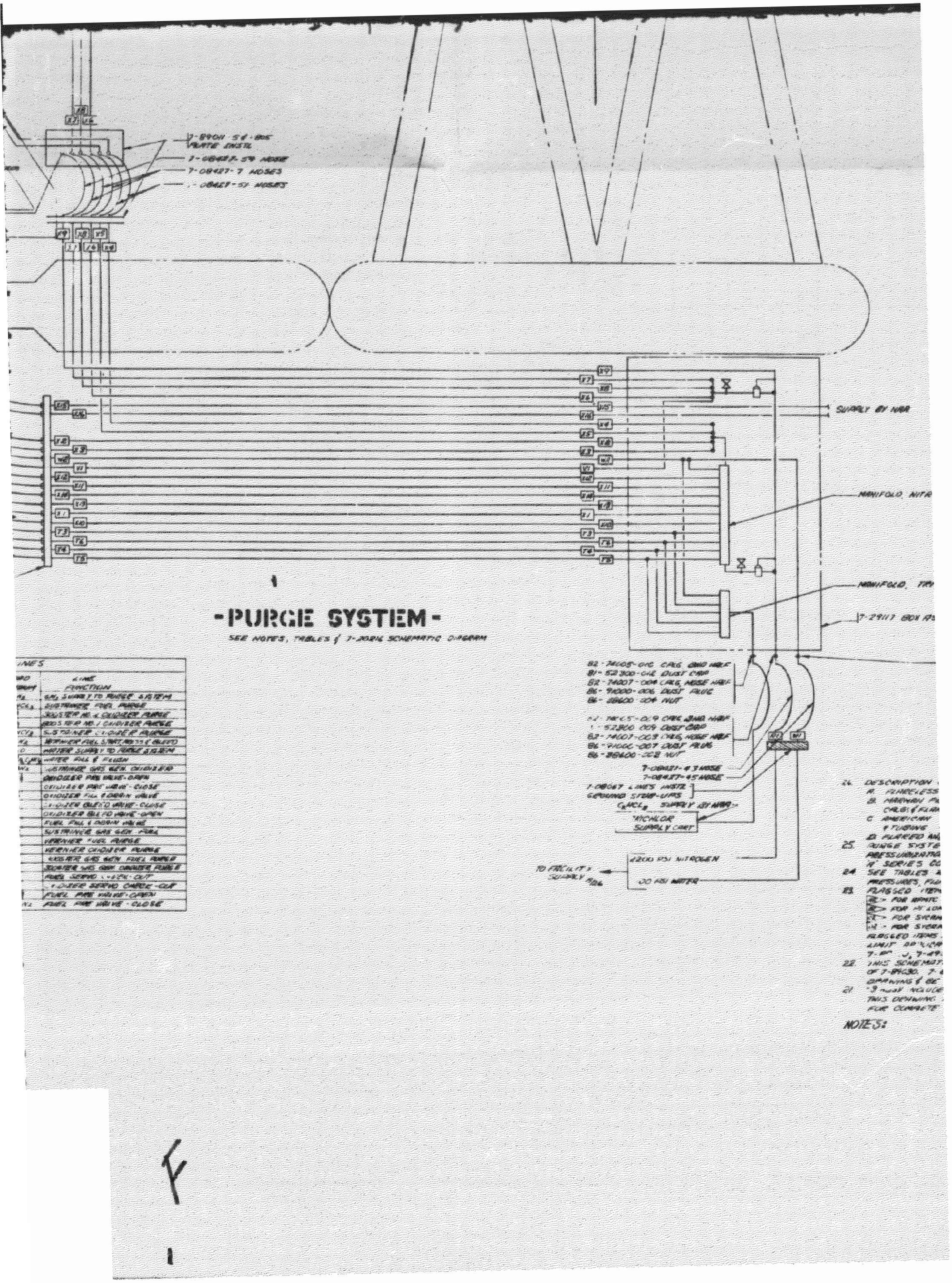
TABLE 22		
INSTL NO.	LINE CODE	DESCRIPTION
7-89272-1	JJ	FUEL START, LAUNCHER
7-89274	B1, D1	MISSLE HYD. 1ST STAGE, LAUNCHER
7-89274-1	B2, D2	MISSLE HYD. 2ND STAGE, LAUNCHER
7-89275	A2, H, P2, P3, P4	LOX TANK PRESSURIZATION, LAUNCHER
7-89276	A, E, P1	FUEL TANK PRESSURIZATION, LAUNCHER
7-89277	K, K1	HYD. RES. PRESS., LAUNCHER
7-89278	C6, F	VESSLE HELIUM CHARGE, LAUNCHER
7-89279-1	G, G3	MISSLE ENGINE CONTROL, LAUNCHER
7-89280	S3 [illegible] S3R T1 T2	PNEUMATIC ACTUATOR, LAUNCHER
7-89281	N2, S3, S4, S3R, S4R	HYDRAULIC ACTUATOR, LAUNCHER
7-89282	C5, C7	VALVE ACTUATING (HYD.), LAUNCHER
7-89283	G2, S2	EMERGENCY HYD. ACTUATOR, LAUNCHER
7-89419	PURGE SYSTEM LINES	PROPULSION PURGE SYSTEM, LAUNCHER
7-89[illegible]-36-1	CP3, CP4	LINES INSTL, PROPELLANT (LAUNCHER)
7-89001-1	U2	LINES INSTL, HYD., 2ND STAGE (LAUNCHER)
7-89002-1	U1	LINES INSTL, HYD., 1ST STAGE (LAUNCHER)
7-08067	G, G2 (SEE 24-1-049)	LINES INSTL, [illegible] (LAUNCHER)
7-89095	CP1, CP2	CHARGER PANEL INSTL (LAUNCHER)

TABLE 25: PURGE SYSTEM LINES								
LINE CODE	TUBING SIZE (in) O.D.	WALL	TUBE MATERIAL MIL-T-6845	PRESSURE (PSI) WORKING	PROOF	TYPE FITTING	FLUID MEDIUM	LINE FUNCTION
A1	1.00	.083	304 CRES	2250	4500	MS	GN_2	GN_2 SUPPLY TO PURGE SYSTEM
T3	.50	.035	↓	500	1000	↓	C_2HCl_3	SUSTAINER FUEL PURGE
T4	.50	.035		↓	↓		↓	BOOSTER NO. 2 OXIDIZER PURGE
T5	.50	.035		↓	↓	↓	↓	BOOSTER NO. 1 OXIDIZER PURGE
T6	.50	.035		500	1000	MS	C_2HCl_3	SUSTAINER OXIDIZER PURGE
V1	.50	.035		500	1000	MS	GN_2	VERNIER FUEL START, BOOST [illegible]
W1	1.00	.083		100	200	AN	H_2O	WATER SUPPLY TO PURGE SYSTEM
W2	.75	.049		500	1000	AN	[illegible]	WATER FILL & FLUSH
X1	.25	.028		500	1000	MS	GN_2	SUSTAINER GAS GEN. OXIDIZER
X4	↓	↓		1000	2000	↓	↓	OXIDIZER PRE VALVE-OPEN
X5				1000	2000			OXIDIZER PRE VALVE-CLOSE
X6				500	1000			OXIDIZER FILL & DRAIN VALVE
X7				500	1000			OXIDIZER BLEED VALVE-CLOSE
X8	↓	↓		500	1000			OXIDIZER BLEED VALVE-OPEN
X9	.25	.028		2250	4500			FUEL FILL & DRAIN VALVE
X10	.375	.035		500	1000			SUSTAINER GAS GEN. FUEL
X11	.25	.028		↓	↓			VERNIER FUEL PURGE
X12	.25	.028						VERNIER OXIDIZER PURGE
X13	.375	.035						BOOSTER GAS GEN. FUEL PURGE
X14	.375	.035						BOOSTER GAS GEN. OXIDIZER PURGE
X15	.25	.028		↓	↓			FUEL SERVO CHECK-OUT
X16	↓	↓		500	1000			OXIDIZER SERVO CHECK-OUT
X2	↓	↓	↓	1000	2000	↓	↓	FUEL PRE VALVE-OPEN
X3	.25	.028	304 CRES	1000	2000	MS	GN_2	FUEL PRE VALVE-CLOSE

TABLE 21 RISE-OFF DISCONNECTS		
LINE CODE	GROUND HALF	AIRBORNE HALF
A1	7-08225-801	7-08225-5
A2	7-08225-801	7-08225-5
B1	7-08236-801	7-08236-803
B2	7-08236-801	7-08236-803
D1	7-08237-801	7-08237-5
D2	7-08237-801	7-08237-5
E	7-08224-803	7-08224-7
F	7-08226-801	7-08226-7
G	7-08229-801	7-08229-5
H	7-08224-803	7-08224-7
J4	7-02241-3	7-02241-1
U1	7-87546	7-87549
U2	7-87559-1	7-87564

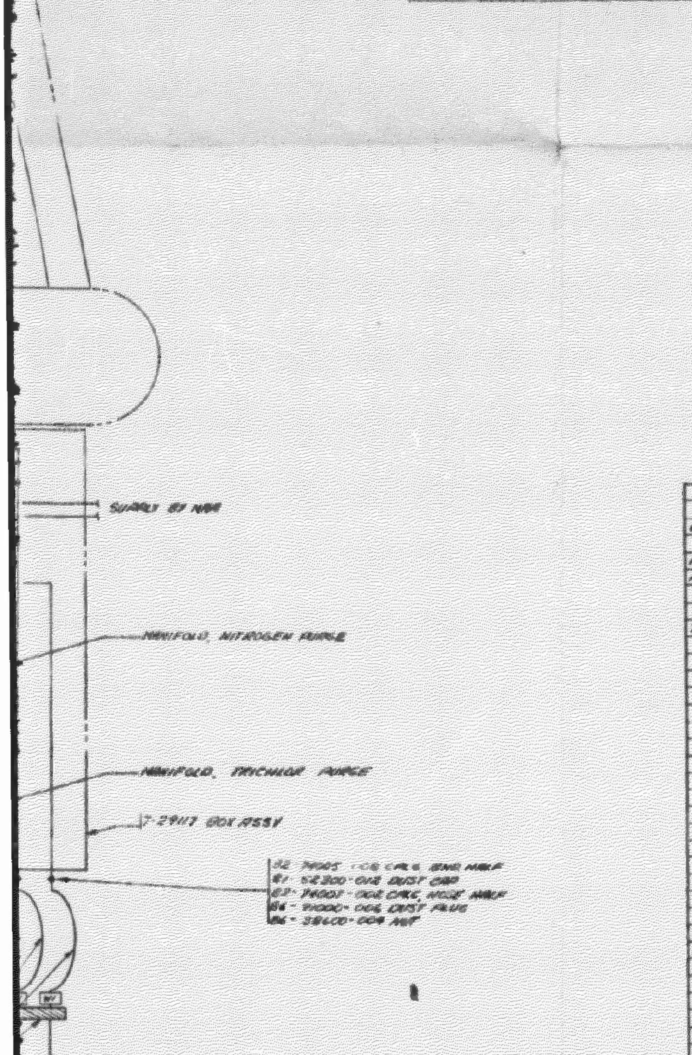
22.16-6.2

E



7-89011-58-805 PLATE INSTL
7-08427-59 HOSE
7-08427-7 HOSES
SUPPLY BY NAA
MANIFOLD, NITR
MANIFOLD, TRI
7-29117 BOX ASSY
-PURGE SYSTEM-
SEE NOTES, TABLES & 7-20216 SCHEMATIC DIAGRAM
LINE FUNCTION
SUSTAINER FUEL PURGE
BOOSTER NO. 1 OXIDIZER PURGE
SUSTAINER OXIDIZER PURGE
VERNIER FUEL START, RESS & BLEED
WATER SUPPLY TO PURGE SYSTEM
WATER FILL & FLUSH
SUSTAINER GAS GEN. OXIDIZER
OXIDIZER PRE VALVE-OPEN
OXIDIZER PRE VALVE-CLOSE
OXIDIZER FILL & DRAIN VALVE
OXIDIZER BLEED VALVE-CLOSE
OXIDIZER BLEED VALVE-OPEN
FUEL FILL & DRAIN VALVE
SUSTAINER GAS GEN. FUEL
VERNIER FUEL PURGE
VERNIER OXIDIZER PURGE
BOOSTER GAS GEN. FUEL PURGE
FUEL SERVO CHECK-OUT
FUEL PRE VALVE-OPEN
FUEL PRE VALVE-CLOSE
B2-74005-010 CPLG GND HALF
B1-52300-010 DUST CAP
B2-74007-004 CPLG HOSE HALF
B6-91000-006 DUST PLUG
B6-28600-004 NUT
B2-74007-003 CPLG HOSE HALF
B6-91000-007 DUST PLUG
B6-28600-003 NUT
7-08427-43 HOSE
7-08427-45 HOSE
7-08667 LINES INSTL
GROUND STUB-UPS
SUPPLY BY NAA
TRICHLOR SUPPLY CART
2200 PSI NITROGEN
TO FACILITY SUPPLY
NOTES:
F

0-75001	REPORT: CLEAN / PURGE PROCEDURE FOR ... SYSTEM COMPONENTS
0-75002	REPORT: CLEAN / PURGE PROCEDURE FOR ... SYSTEM COMPONENTS
7-20009	SCHEMATIC DIAGRAM - PROPULSION SYSTEM (...)



CONVAIR PART NO.	DESCRIPTION	VENDOR PART NO.	VENDOR	ZONE
89-05001-005	TEMP TRANSDUCER	1492	TRANS-SONICS CORP	C/19
MS28751-4-2400	HOSE - RUBBER	———	———	[illegible]
MS28751-4-0900	HOSE - RUBBER	———	———	[illegible]
7-08411-1	CHARGING PANEL	890400	ACCESSORY PROD. CORP.	[illegible]
7-08267-1	CYL - STABILIZER	11097	HASKEL - LOUD MACHINE WORKS	[illegible]
7-08265	CYL - PNEU.	D-50682	J.C. PEACOCK	C/27
7-08264-1	CYL - SLAVE	D-50684	J.C. PEACOCK	[illegible]
7-08263	CYL - MASTER	D-50683	J.C. PEACOCK	C/27
7-08247	CYL - SUPPORT	7815	HASKEL - LOUD MACHINE WORKS	[illegible]
7-89366	CYL (HOLD DOWN) ASSY	———	BRUST TOOL CO.	[illegible]
7-06373-801	TRANSDUCER			B/29
7-06373-5	TRANSDUCER			B/29
81-71900-801	CYL - COMPRESSED GAS			C/106
98-88500-002	RECEIVER - PNEU	890512 OR 890553	WALTER KIDDE CO.	[illegible]
7-08291	RECEIVER - PNEU	1110623 OR 651200	BENDIX AVIATION CORP.	[illegible]
7-08280-1	COMP - N2O MASTER	2253-1	INTERSTATE ENGR. CORP.	C/27
7-08279-1	COMP. N2O SLAB	2252-1	INTERSTATE ENGR. CORP.	[illegible]
7-89384-5	ORIFICE - PNEU			[illegible]
7-89384-1	ORIFICE - PNEU			B/27
7-08335	ORIFICE - PNEU.	2R 1063	GAR PRECISION PROD. CO.	[illegible]
7-08318	ORIFICE - PNEU.	2R 1443 - 015	GAR PRECISION PROD. CO.	[illegible]
7-08301	ORIFICE - PNEU.	A-60052	VINSON MFG. CO.	[illegible]
93-78007-004	FILTER - PNEU.	FIL-30	PRESSURE PRODUCTS	[illegible]
7-08307	FILTER - PNEU.	10025 - 3000	PERMANENT FILTER CORP.	[illegible]
7-08305	FILTER - N2O	58685	PUROLATOR PROD. CO.	[illegible]
7-08302	FILTER - PNEU.	58364	PUROLATOR PROD. CO.	[illegible]

26. DESCRIPTION OF FITTINGS (SEE TABLES 23 & 25):
A. FLARELESS MS 21900 SERIES (CRES).
B. MARMAN PRODUCTS CO., INC., CAT. J-11 SERIES CPLGS & FLANGES USING COPPER (NICKEL PLATED) GASKETS.
C. AMERICAN INSTRUMENT CO. "SUPERPRESSURE" CRES FITTINGS & TUBING (CAT. 406 & 407).
D. FLARED AN800 SERIES (CRES).
25. PURGE SYSTEM NOT INSTALLED ON 7-31-10 (PT. LOMA); PRESSURIZATION TO LOX & FUEL TANKS FOR 7-31-10 TO BE PER "A" SERIES CONFIGURATION ON 7-89100-1.
24. SEE TABLES 21 THRU 25 SHOWN ON 5/10, FOR LINE CODES, OPERATING PRESSURES, FLUIDS, DISCONNECTS & UNITS AS NOTED.
23. FLAGGED ITEMS:
- FOR AFMTC (7-80-8 & 9)
- FOR PT. LOMA (7-31-10)
- FOR SYCAMORE (7-80-5)
- FOR SYCAMORE (7-80-7)

FLAGGED ITEMS ARE INCOMPLETE - FOR COMPLETE C/C EFFECTIVITIES &/OR UNIT APPLICATIONS OF COMPONENTS, ASSYS & INSTLS, SEE 7-... , 7-49302 & 7-49452.
22. THIS SCHEMATIC DIAGRAM 7-89100 REPLACES SCHEMATIC DIAGRAM PORTION OF 7-89030. 7-89030 WILL CONTINUE TO SERVE AS A LINES INSTL DRAWING & BE FURTHER SHOWN AS AN ISOMETRIC ASSY DRAWING.
21. -3 ASSY INCLUDES ALL DATA ON SHEET 2 ONLY & IS LIMITED FOR "B" SERIES. THIS DRAWING IS FOR ENGINEERING REFERENCE ONLY. SEE SHEET 1 FOR COMPLETE DATA ON -1 ASSY FOR "A" SERIES.

NOTES:

B SERIES (SHEET 2 ONLY)

REFERENCE DRAWING

DASH NO.	CHG RECORD NO.	SERIAL NO.	NEXT ASSY	USED ON	CALC UNIT WT	NEXT ASSY	FINAL ASSY	DASH NO.	CHG RECORD NO.	SERIAL NO.	NEXT ASSY	USED ON	CALC UNIT WT	NEXT ASSY	FINAL ASSY	DASH NO.	CHG RECORD
																-1	
																-1	
																-3	E/C 2692
																-3	E/C 2692

APPLICATION — QTY REQD — APPLICATION — QTY REQD

G

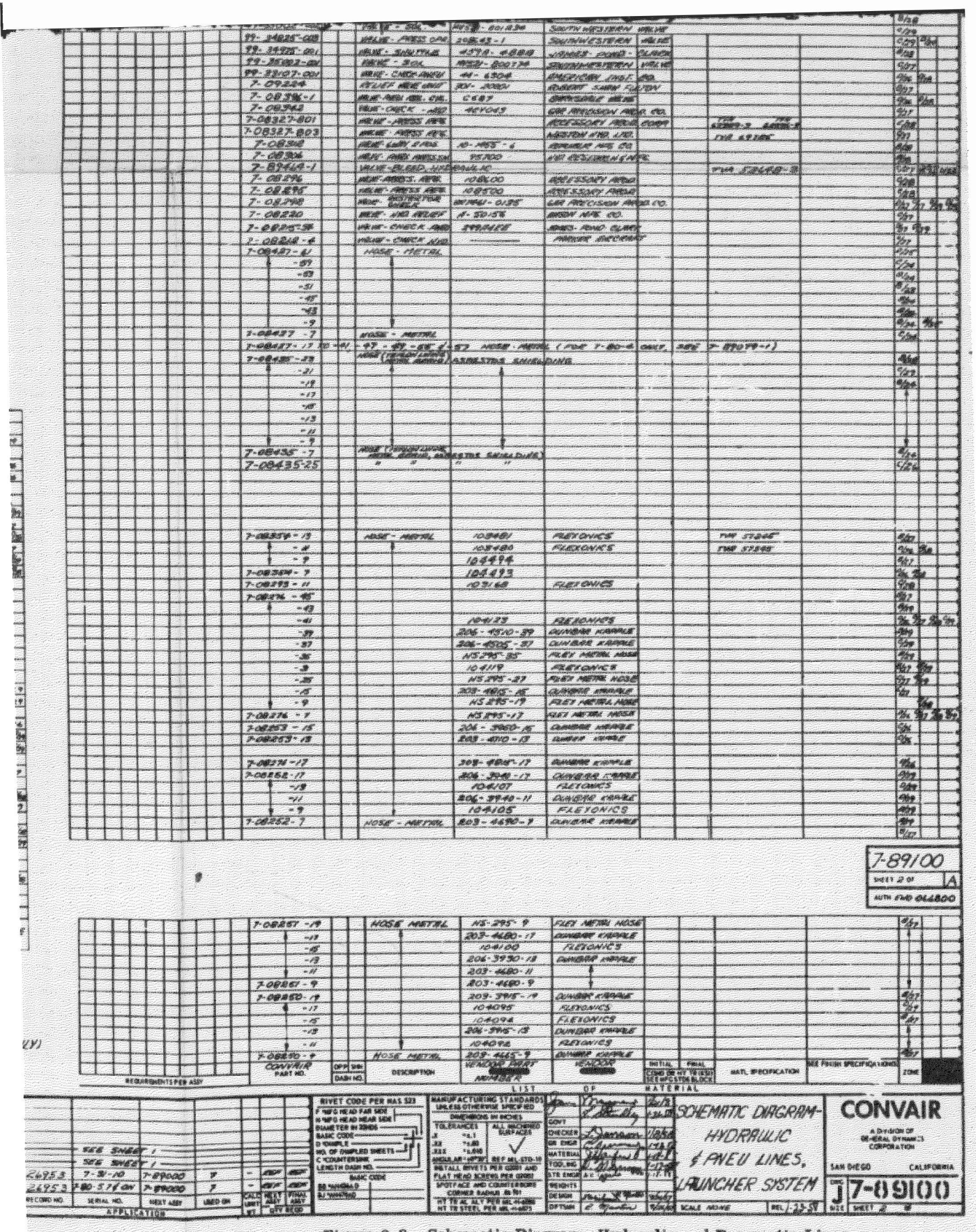
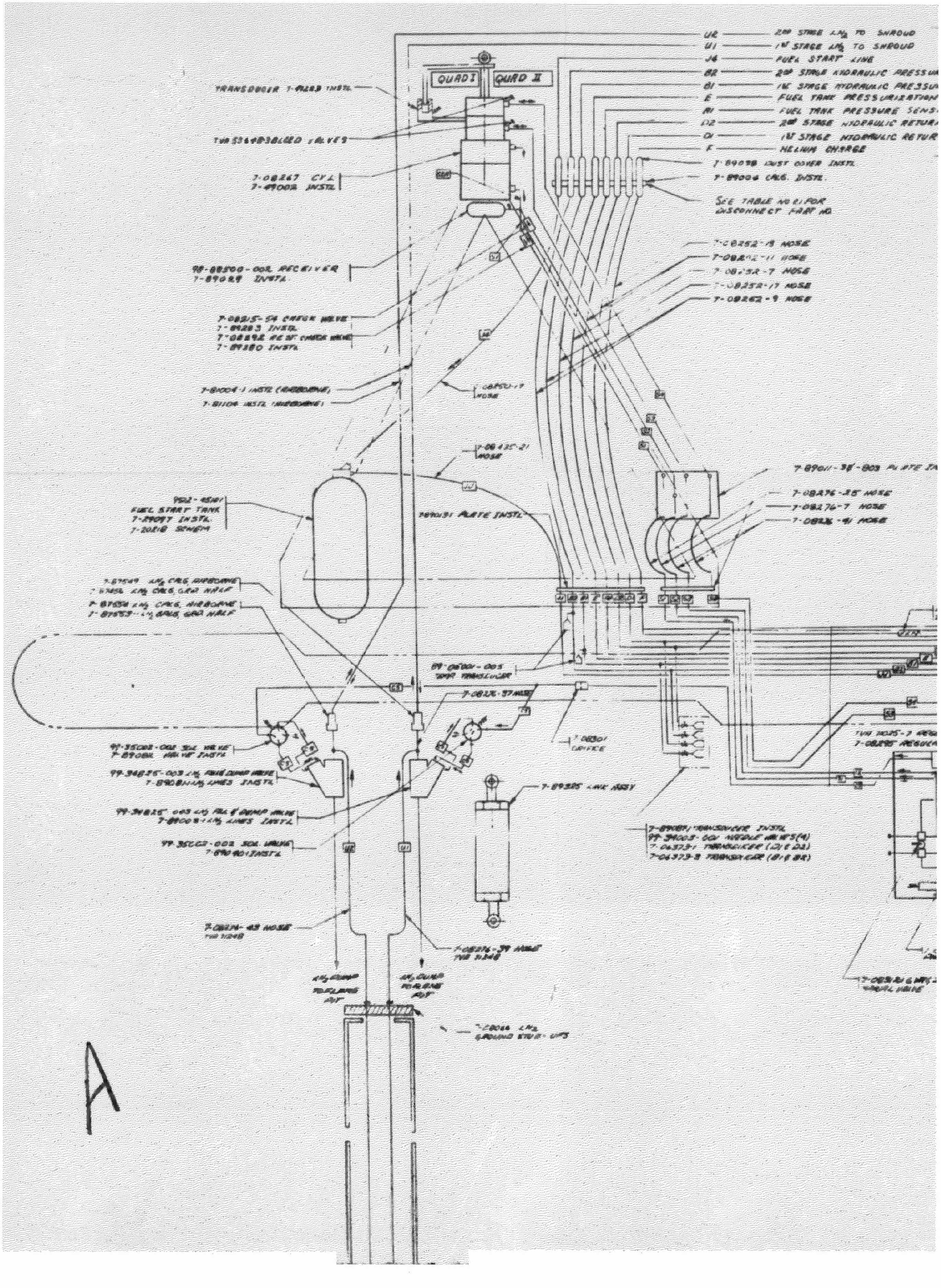
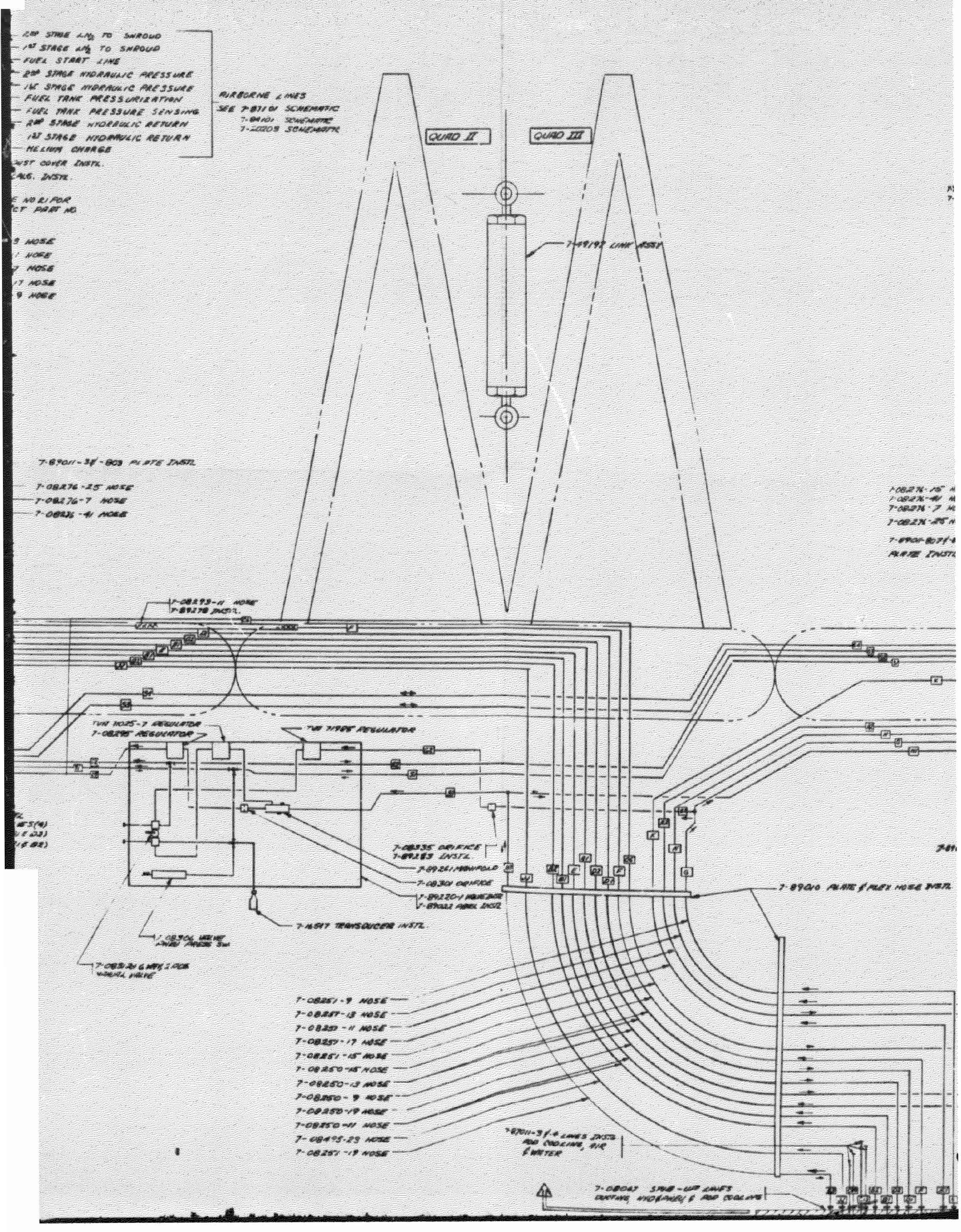


Figure 2-2. Schematic Diagram, Hydraulic and Pneumatic Lines, Launcher Systems (7-89100), B and C Series (Sheet 2 of 2)

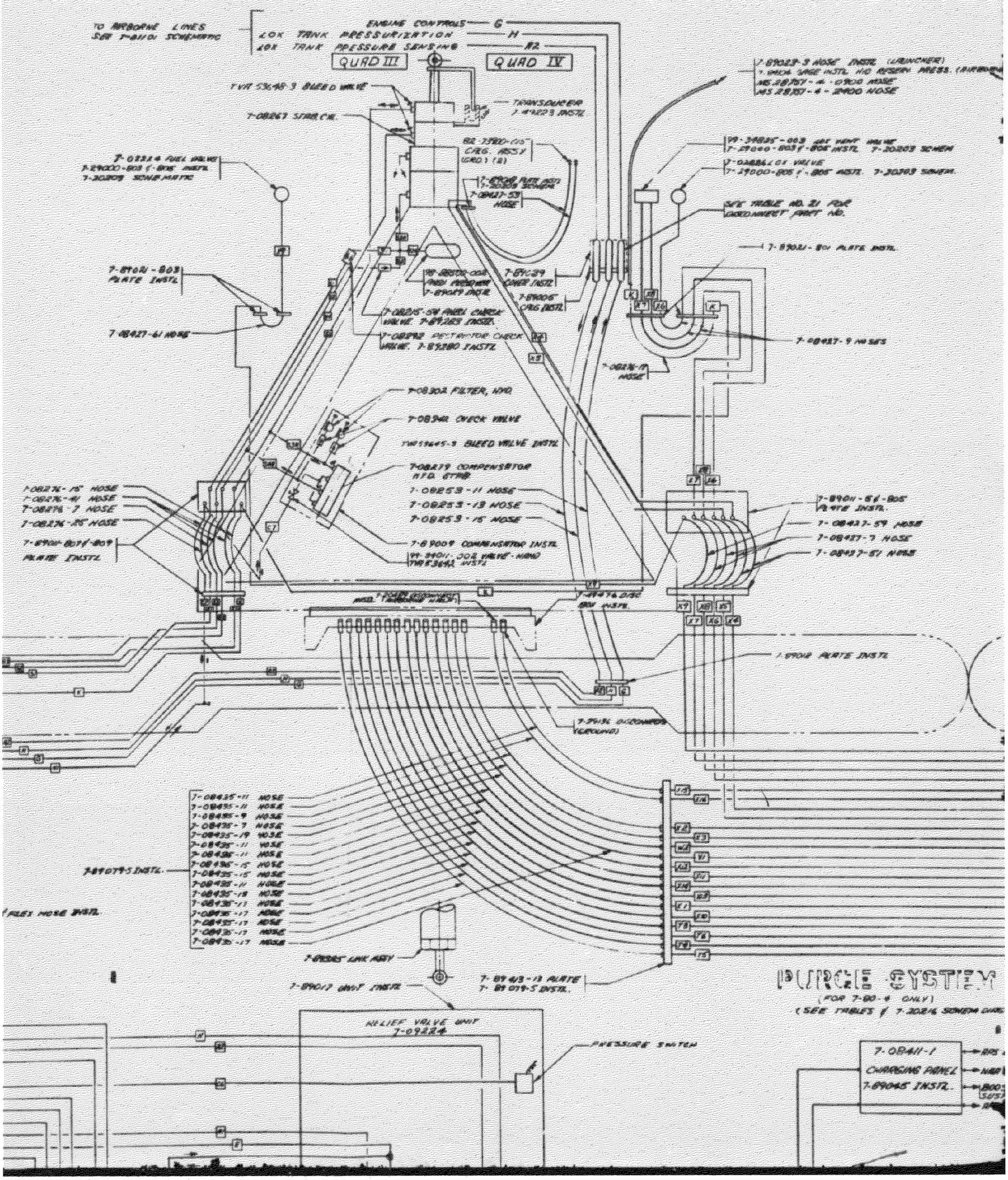


QUAD I
QUAD II
U2 — 2ND STAGE LN2 TO SHROUD
U1 — 1ST STAGE LN2 TO SHROUD
J4 — FUEL START LINE
B2 — 2ND STAGE HYDRAULIC PRESSU
B1 — 1ST STAGE HYDRAULIC PRESSU
E — FUEL TANK PRESSURIZATION
A1 — FUEL TANK PRESSURE SENS
D2 — 2ND STAGE HYDRAULIC RETUR
D1 — 1ST STAGE HYDRAULIC RETUR
F — HELIUM CHARGE
SEE TABLE NO. I FOR DISCONNECT PART NO.
7-08252-9 HOSE
FUEL START TANK
A

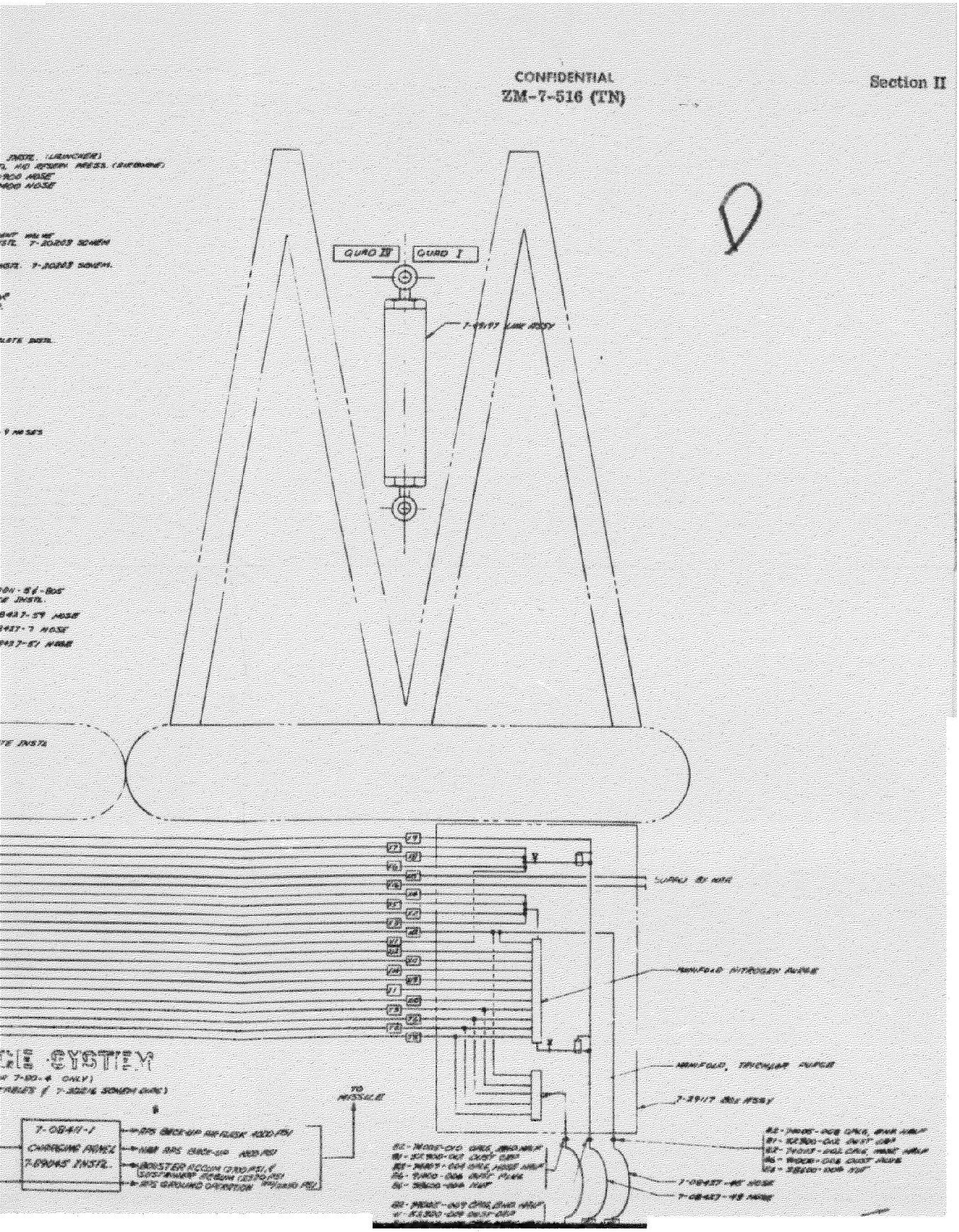
B

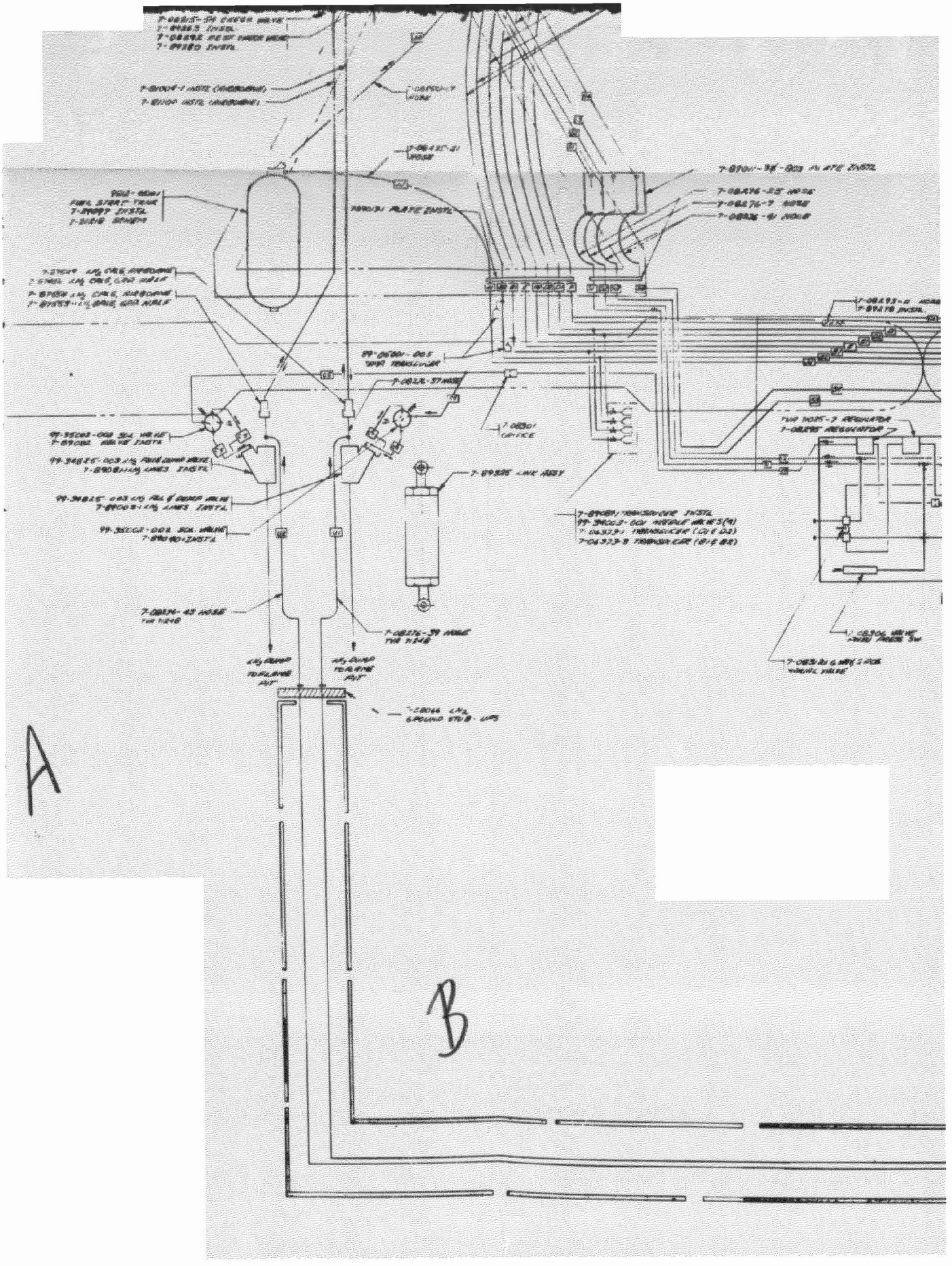

2ND STAGE LN2 TO SHROUD
1ST STAGE LN2 TO SHROUD
FUEL START LINE
2ND STAGE HYDRAULIC PRESSURE
1ST STAGE HYDRAULIC PRESSURE
FUEL TANK PRESSURIZATION
FUEL TANK PRESSURE SENSING
2ND STAGE HYDRAULIC RETURN
1ST STAGE HYDRAULIC RETURN
HELIUM CHARGE
AIRBORNE LINES
SEE 7-87101 SCHEMATIC
7-84101 SCHEMATIC
7-20203 SCHEMATIC
QUAD II
QUAD III
7-49192 LINK ASSY
7-89011-3 & -803 PLATE INSTL
7-08276-25 HOSE
7-08276-7 HOSE
7-08276-41 HOSE
7-08293-11 HOSE
7-89278 INSTL.
7-08295 REGULATOR
7-08335 ORIFICE
7-89263 INSTL.
7-89261 MANIFOLD
7-08301 ORIFICE
7-89010 PLATE & FLEX HOSE INSTL.
7-16517 TRANSDUCER INSTL.
7-08251-9 HOSE
7-08257-13 HOSE
7-08251-11 HOSE
7-08257-17 HOSE
7-08251-15 HOSE
7-08250-15 HOSE
7-08250-13 HOSE
7-08250-9 HOSE
7-08250-19 HOSE
7-08250-11 HOSE
7-08495-23 HOSE
7-08251-19 HOSE
7-08047 SHIP-UP LINES
7-08276-15 HOSE
7-08276-41 HOSE
7-08276-7 HOSE
7-08276-25 HOSE
PLATE INSTL

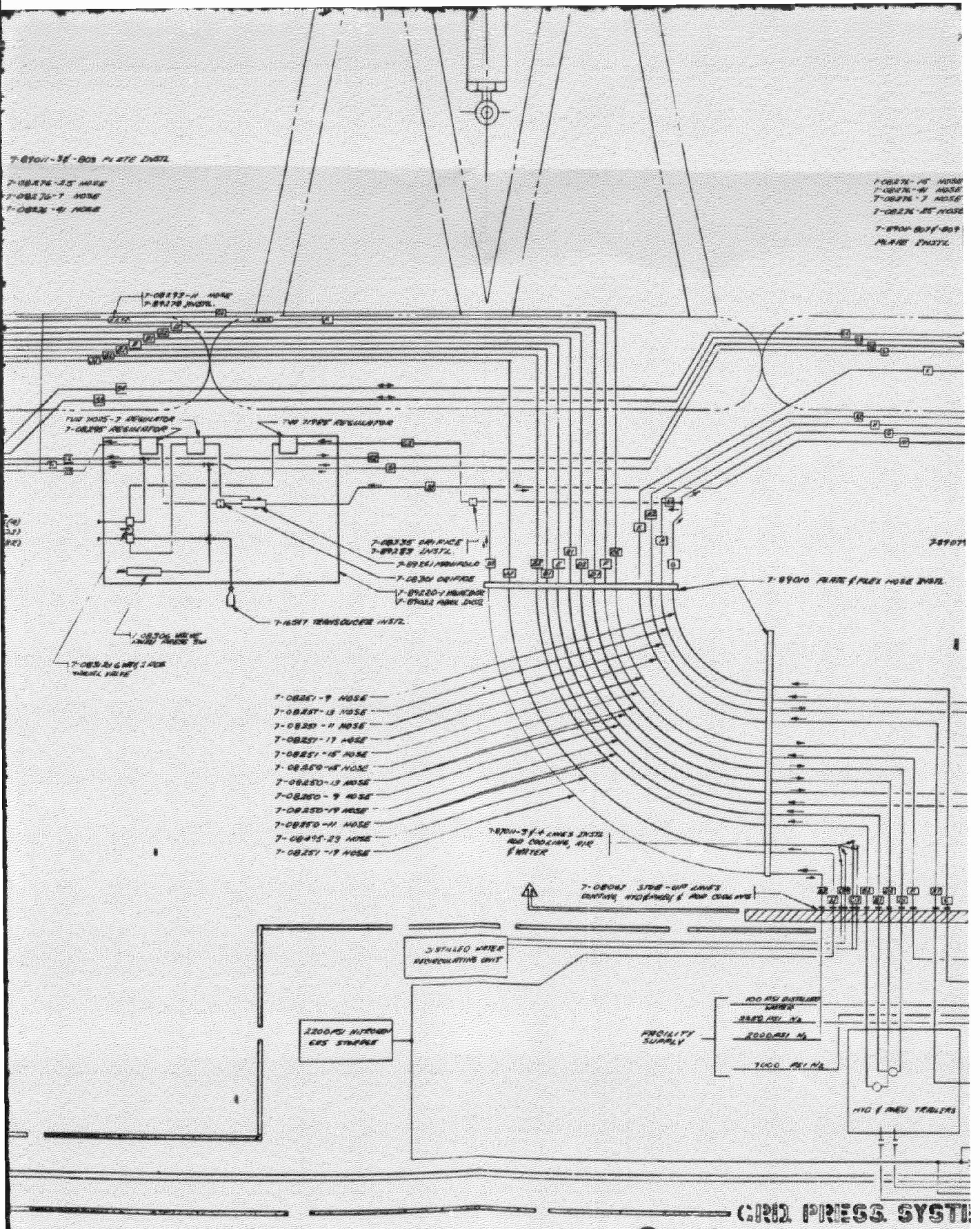
C



TO AIRBORNE LINES
ENGINE CONTROLS — G
LOX TANK PRESSURIZATION — H
LOX TANK PRESSURE SENSING — R2
QUAD III
QUAD IV
TRANSDUCER
7-08267 STAB CYL.
7-08302 FILTER, HYD.
7-08241 CHECK VALVE
7-08279 COMPENSATOR
7-08253-11 HOSE
7-08253-13 HOSE
7-08253-15 HOSE
7-89009 COMPENSATOR INSTL.
7-08276-15 HOSE
7-08276-7 HOSE
7-08276-35 HOSE
7-08427-61 HOSE
7-08427-9 HOSES
7-08427-59 HOSE
7-08427-7 HOSE
7-08427-51 HOSE
7-89012 PLATE INSTL.
7-89021-801 PLATE INSTL.
SEE TABLE NO. 21 FOR
7-89017 UNIT INSTL.
7-08585 LINK ASSY
RELIEF VALVE UNIT
7-09224
PRESSURE SWITCH
PURGE SYSTE
(FOR 7-90-4 ONLY)
7-08411-1
CHARGING PANEL
7-89045 INSTL.

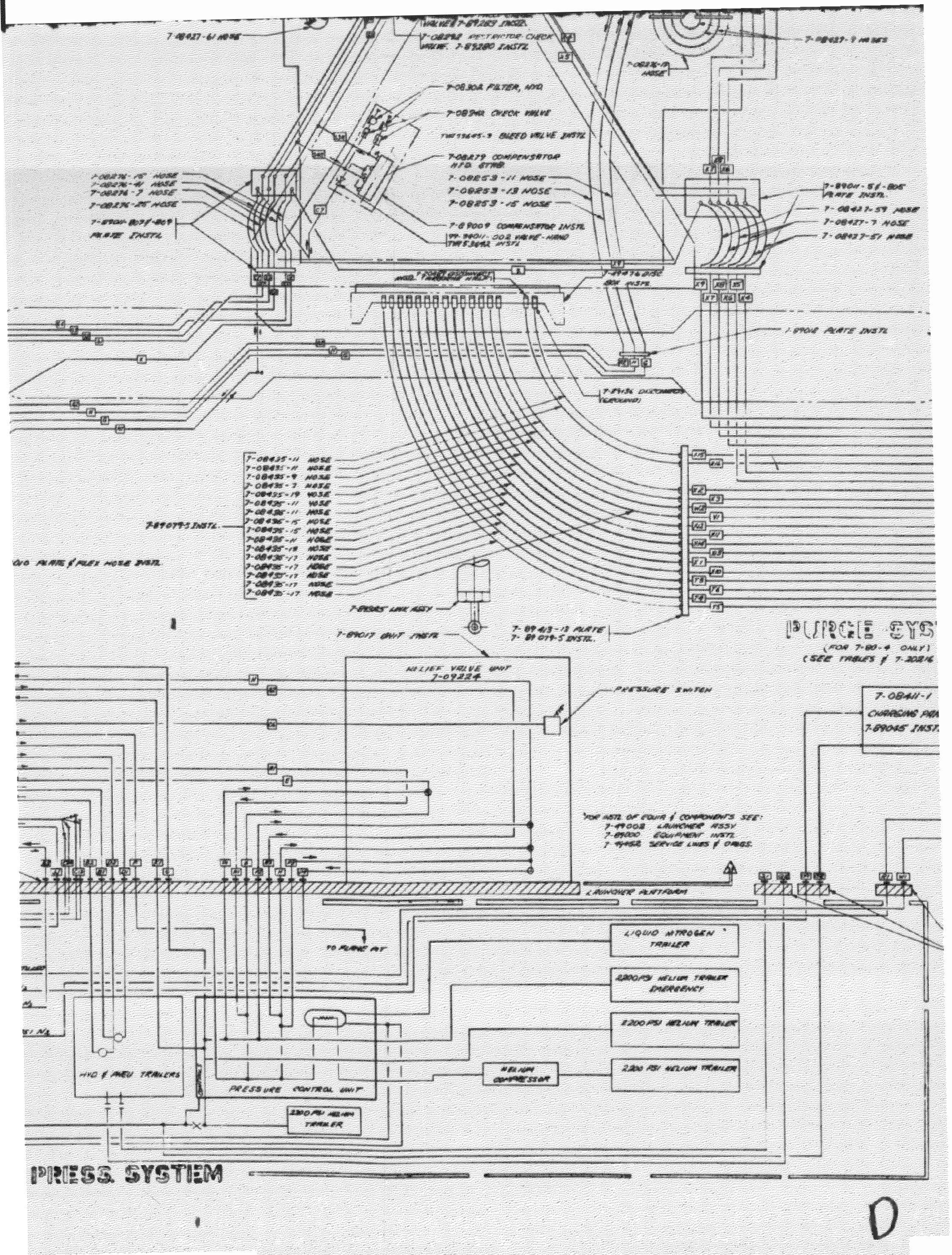

GUIDE III
GUIDE I
MANIFOLD, NITROGEN PURGE
MANIFOLD, TRICHLAR PURGE
TO MISSILE


A
B



CRYO PRESS. SYSTE

C


7-08302 FILTER, HYD
7-08342 CHECK VALVE
7-08279 COMPENSATOR
7-08253-11 HOSE
7-08253-13 HOSE
7-08253-15 HOSE
7-89009 COMPENSATOR INSTL
7-08427-59 HOSE
7-08427-7 HOSE
7-89018 PLATE INSTL
7-89017 UNIT INSTL
PURGE SYS
RELIEF VALVE UNIT
7-09224
PRESSURE SWITCH
CHARGING PAN
LAUNCHER PLATFORM
LIQUID NITROGEN TRAILER
2200 PSI HELIUM TRAILER
2200 PSI HELIUM TRAILER
HELIUM COMPRESSOR
PRESSURE CONTROL UNIT
HYD & PNEU TRAILERS
PRESS. SYSTEM
D

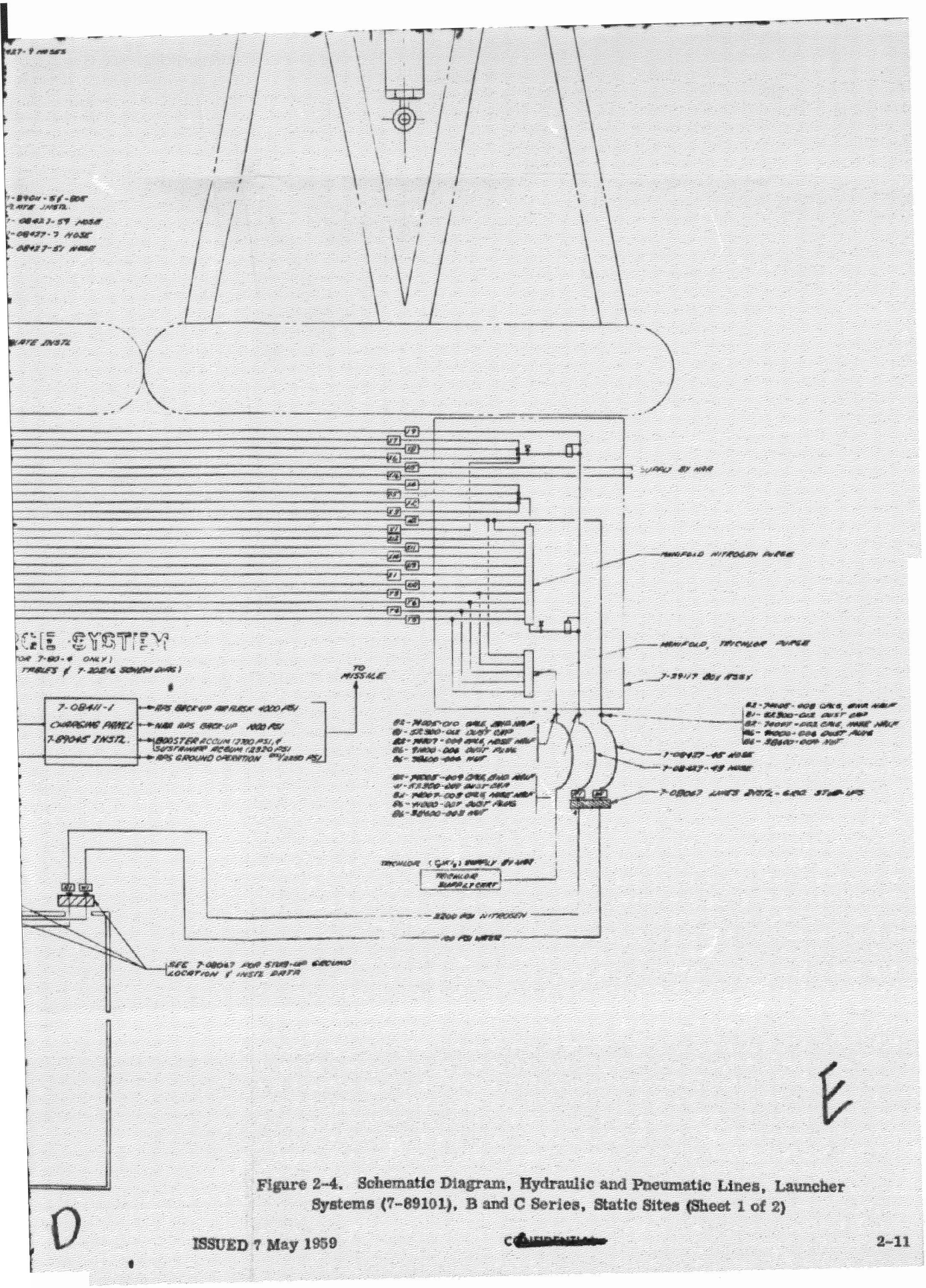


Figure 2-4. Schematic Diagram, Hydraulic and Pneumatic Lines, Launcher Systems (7-89101), B and C Series, Static Sites (Sheet 1 of 2)

TABLE 25								
LINE CODE	TUBING SIZE (in.) O.D.	WALL	TUBING MATERIAL MIL-T-6845	PRESSURE (PSI) OPERATING	PROOF	TYPE FITTING	FLUID MEDIUM	LINE FUNCTION
-3	.50	.035	304 CRES	500	1000	HS	GN_2	SUSTAINER FUEL PURGE
-4	.50	.035	↓	↓	↓	↓	↓	BOOSTER NO. 2 OXIDIZER PURGE
-5	.50	.035	↓	↓	↓	↓	↓	BOOSTER NO. 1 OXIDIZER PURGE
-6	.50	.035	↓	500	1000	↓	GN_2	SUSTAINER OXIDIZER PURGE
V1	.50	.035	↓	500	1000	HS	GN_2	VERNIER FUEL SRT TNK PRESS & BLEED
V2	.75	.049	↓	500	1000	SH	[illegible]	VERNIER FILL & FLUSH
X1	.25	.028	↓	500	1000	HS	GN_2	SUSTAINER GAS GENERATOR OXIDIZER
X2	↓	↓	↓	1000	2000	↓	↓	FUEL FIRE VALVE - OPEN
X3	↓	↓	↓	↓	↓	↓	↓	FUEL FIRE VALVE - CLOSE
X4	↓	↓	↓	↓	↓	↓	↓	OXIDIZER FIRE VALVE - OPEN
X5	↓	↓	↓	1000	2000	↓	↓	OXIDIZER FIRE VALVE - CLOSE
X6	↓	↓	↓	500	1000	↓	↓	OXIDIZER FILL & DRAIN VALVE
X7	↓	↓	↓	500	1000	↓	↓	OXIDIZER BLEED VALVE - CLOSE
X8	↓	↓	↓	500	1000	↓	↓	OXIDIZER BLEED VALVE - OPEN
X9	.25	.028	↓	2250	4500	↓	↓	FUEL FILL & DRAIN VALVE
X10	.375	.035	↓	500	1000	↓	↓	SUSTAINER GAS GENERATOR FUEL
X11	.25	.028	↓	↓	↓	↓	↓	VERNIER FUEL PURGE
X12	.25	.028	↓	↓	↓	↓	↓	VERNIER OXIDIZER PURGE
X13	.375	.035	↓	↓	↓	↓	↓	BOOSTER GAS GEN. FUEL PURGE
X14	.375	.035	↓	↓	↓	↓	↓	BOOSTER GAS GEN. OXIDIZER PURGE
X15	.25	.028	↓	↓	↓	↓	↓	FUEL SERVO CHECK-OUT
X16	.25	.028	304 CRES	500	1000	HS	GN_2	OXIDIZER SERVO CHECK-OUT

A

TABLE 24	
LIST OF WDD REPORTS, SCHEMATICS, & DWGS ASSOCIATED WITH LAUNCHER OPERATIONS	
7-89001	SCHEM DIAG. - LAUNCHER RELEASE SYSTEM - [illegible]
7-89019	↓ - LAUNCHER RELEASE SYSTEM - [illegible]
7-89044	↓ - LAUNCHER RELEASE SYSTEM - [illegible]
7-89101	↓ - HYD. SYSTEM (AIRBORNE)
7-81101	↓ - PRESSURIZATION SYSTEM (AIRBORNE)
7-89001	↓ - GRD. SUPPORT PRESSURIZATION SYSTEM
7-89049	↓ - PNEU. BOOSTER UNIT
7-20202	↓ - PRESSURIZATION SYSTEM - GSE 1-4 STAND
7-20203	SCHEM DIAG. - PROPULSION SYSTEM (AIRBORNE)
ZM-7-576	REPORT - PRELIMINARY OPR. INSTRUCTIONS - PNEU & HYD SYSTEMS, LAUNCHER
ZJ-7-089	↓ - FUNCTIONAL TEST & BLEED (SHAKEDOWN) PROCEDURE, LAUNCHER
ZM-7-3178	↓ - LEAK TEST PROCEDURE - LAUNCHER TUBING INSTLS.
ZM-7-196	↓ - PRELIMINARY OPR. & MAINTENANCE INSTRUCTIONS, LAUNCHER ASSY
0-75010	↓ - FLARELESS TUBE FITTINGS - ASSY & INSTL.
0-75001	↓ - CLEAN & PACKAGE PROCEDURE FOR FUEL SYSTEM COMPONENTS
0-75002	REPORT - CLEAN & PACKAGE PROCEDURE FOR LOX SYSTEM COMPONENTS
7-49452	SERVICE LINES & COUPLINGS INSTLS - LAUNCHER

B

99-35002-002	VALVE - SOL	MS31-00234	SOUTHWESTERN VALVE		9/27	
99-34925-003	VALVE-PRESS CONT.	208643-1	SOUTHWESTERN VALVE		9/24	9/27
99-34003-001	VALVE-SHUTOFF HAND	[illegible] - 1/8	JAS. P. MARSH CO.		9/26	
7-89217	CHG GRD VALVE LN2	——	ELLIOT ENGR		9/27	
7-09224	RELIEF VALVE UNIT	301-20001	ROBERT SHAW FULTON		8/24	
7-08342	VALVE - CHECK HYD	4CV043	GAR PRECISION PROD. CO.		9/25	
7-08335	ORIFICE - PNEU	2R 1063	GAR PRECISION PROD. CO.		9/26	
7-08327-3	VALVE-PRESS REG.	108400	ACCESSORY PROD. CORP.	TYR 71025-7	9/26	
7-08327-1	VALVE-PRESS REG.	15400	WESTON HYD. LTD.	TYR 71985	9/26	
7-08312	VALVE-4 WAY, 2 POS.	10-1455-6	REPUBLIC MFG CO.		9/26	
7-08306	VALVE-PNEU PRESS	95700	HYD. RES. & MFG.		9/26	
7-08302	FILTER - PNEU	58364	PUROLATOR PROD CO.		9/25	
7-08301	ORIFICE - PNEU.	R-60052	VINSON MFG. CO.		9/26	9/26
7-08295	VALVE-PRESS REG.	108500	ACCESSORY PROD CORP.		9/26	
7-08292	VALVE RESTRICTOR CHECK	8R7461-0135	GAR PRECISION PROD. CORP.		9/25	9/27
7-08215-54	VALVE-CHECK PNEU	299N4EE	JAMES-POND-CLARK		9/26	9/27
7-08279	PUMP-HYD. STBS	2252-1	INTERSTATE ENGR. CORP		9/25	
99-88500-002	REGULATOR - PNEU.	840312	WALTER KIDDE CO.		9/26	9/27
7-08267	CK. - STABILIZER	11097	HANSEL-LOUD MACHINE WORKS		9/26	9/27
MS28759-4-2400	HOSE - RUBBER	——	——		9/26	
MS28751-4-0900	HOSE - RUBBER	——	——		9/26	
7-08411-1	CHARGING PANEL	890400	ACCESSORY PROD. CORP.		9/26	
7-08435-23	HOSE (TEFLON LINING METAL BRAID)				9/27	
-21					9/27	
-19					9/26	
-17					9/26	
-15					9/24	
-13					9/24	
-11					9/24	
-9					9/24	
7-08435-7	HOSE (TEFLON LINING METAL BRAID)				9/26	
7-08427-61	HOSE - METAL				9/24	
-59					9/24	
-53					9/24	
-51					9/24	
-45					9/23	
-43					9/23	
-9					9/24	
7-08427-7					9/24	
7-08293-11		103168	FLEXONICS		9/26	
7-08276-43		104202	FLEXONICS		9/27	
-41		104123	FLEXONICS		9/25	9/26
-39		206-4510-39	DUNBAR KAPPLE		9/27	
-37		206-4505-37	DUNBAR KAPPLE		9/27	
-25		MS-295-27	FLEX METAL HOSE		9/25	9/26
-15		203-4815-15	DUNBAR KAPPLE		9/25	
-11		203-4815-17	DUNBAR KAPPLE		9/26	
7-08276-7		MS 295-17	FLEX METAL HOSE		9/25	9/26
7-08253-15		206-3950-15	DUNBAR KAPPLE		9/24	
7-08253-13		203-4710-13	DUNBAR KAPPLE		9/24	
7-08253-11		203-4710-11	DUNBAR KAPPLE		9/24	
7-08252-17		206-3940-17	DUNBAR KAPPLE		9/26	
-13		104107	FLEXONICS		9/26	
-11		206-3940-11	DUNBAR KAPPLE		9/26	
-9		104105	FLEXONICS		9/26	
7-08252-7		203-4690-7	DUNBAR KAPPLE		9/26	
7-08251-19	HOSE - METAL	MS-295-9	FLEX METAL HOSE		9/26	

B SERIES (SHEET 2 ONLY)

7-89101

TABLE 24	
LIST OF TECH. REPORTS, SCHEMATICS, & SPECS ASSOCIATED WITH LAUNCHER OPERATIONS	
7-89007	SCHEM. DIAG. - LAUNCHER RELEASE SYSTEM - ARMTS
7-89019	- LAUNCHER RELEASE SYSTEM - KSB
7-89044	- LAUNCHER RELEASE SYSTEM - SYCAMORE
7-89101	- HYD. SYSTEM (AIRBORNE)
7-89101	- PRESSURIZATION SYSTEM (AIRBORNE)
7-89001	- GRD. SUPPORT PRESSURIZATION SYSTEM
7-89049	- PNEU. BOOSTER UNIT
7-20219	- PRESSURIZATION SYSTEM - KSB 1-4 STAND
7-20203	SCHEM. DIAG. - PROPULSION SYSTEM (AIRBORNE)
ZM-7-576	REPORT - PRELIMINARY OPR. INSTRUCTIONS - PNEU. & HYD. SYSTEMS, LAUNCHER
ZM-7-049	- FUNCTIONAL TEST & BLEED (SHAKEDOWN) PROCEDURE, LAUNCHER
ZM-7-3178	- LEAK TEST PROCEDURE - LAUNCHER TUBING INSTL.
ZM-7-196	- PRELIMINARY OPR. & MAINTENANCE INSTRUCTIONS, LAUNCHER ASSY
0-75010	- FLARELESS TUBE FITTINGS - ASSY & INSTL.
0-75001	- CLEAN & PACKAGE PROCEDURE FOR PNEU. SYSTEM COMPONENTS
0-75002	REPORT - CLEAN & PACKAGE PROCEDURE FOR HYD. SYSTEM COMPONENTS
7-49452	SERVICE LINES & COUPLINGS INSTLS - LAUNCHER

23. DESCRIPTION OF FITTINGS (SEE TABLES 23 & 25):
   A. FLARELESS "MS21900" SERIES (CRES).
   B. HARMAN PRODUCTS CO., INC., CAT "J-H" SERIES JOINTS, CRESS & FLANGES, USING COPPER (NICKEL-PLATED) GASKETS.
   C. AMERICAN INSTRUMENT CO. "SUPERPRESSURE" CRES FITTINGS & TUBING. (CAT 406 & 407).
   D. FLARED "AN800" SERIES (CRES).

22. THIS SCHEMATIC DIAGRAM 7-89101 REPLACES SCHEMATIC DIAGRAM PORTION OF 7-89031. 7-89031 WILL CONTINUE TO SERVE AS A LINES INSTL DRAWING AND BE FURTHER SHOWN AS AN ISOMETRIC ASSY DRAWING.

21. -3 ASSY INCLUDES ALL DATA ON SHEET 2 ONLY & IS LIMITED FOR "B" SERIES. THIS DRAWING IS FOR ENGINEERING REFERENCE ONLY. SEE SHEET 1 FOR COMPLETE DATA ON -1 ASSY FOR "A" SERIES.

NOTES:

DASH NO.	CHG RECORD NO.	SERIAL NO.	NEXT ASSY	USED ON	CALC UNIT WT	NEXT ASSY	FINAL ASSY	DASH NO.	CHG RECORD NO.	SERIAL NO.	NEXT ASSY	USED ON	CALC UNIT WT	NEXT ASSY	FINAL ASSY	DASH NO.	CHG RECORD NO.
																-1	
																-1	
																-3	SEE NOTE 21
																-3	SEE NOTE 21
APPLICATION					QTY REQD			APPLICATION					QTY REQD				

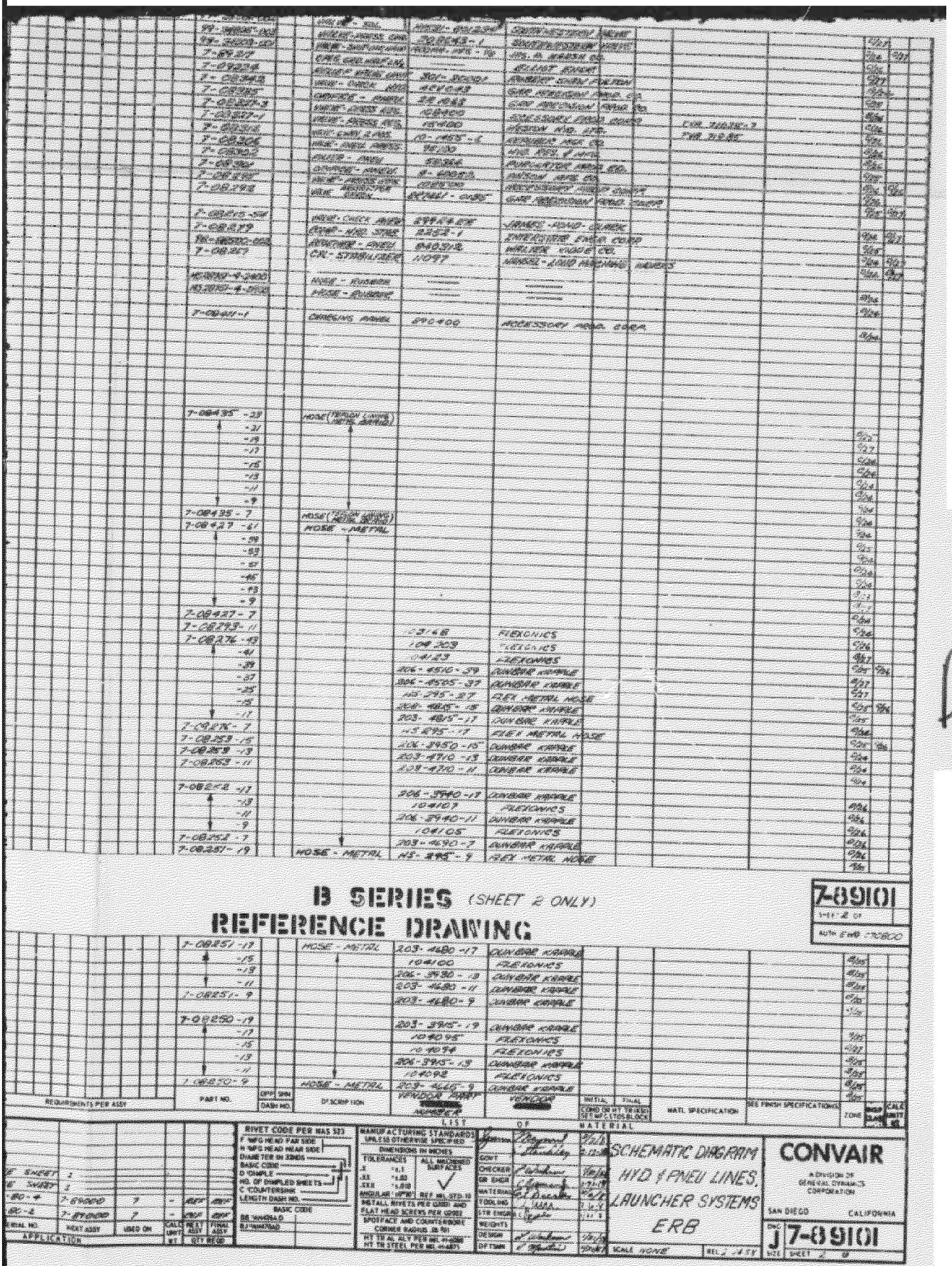
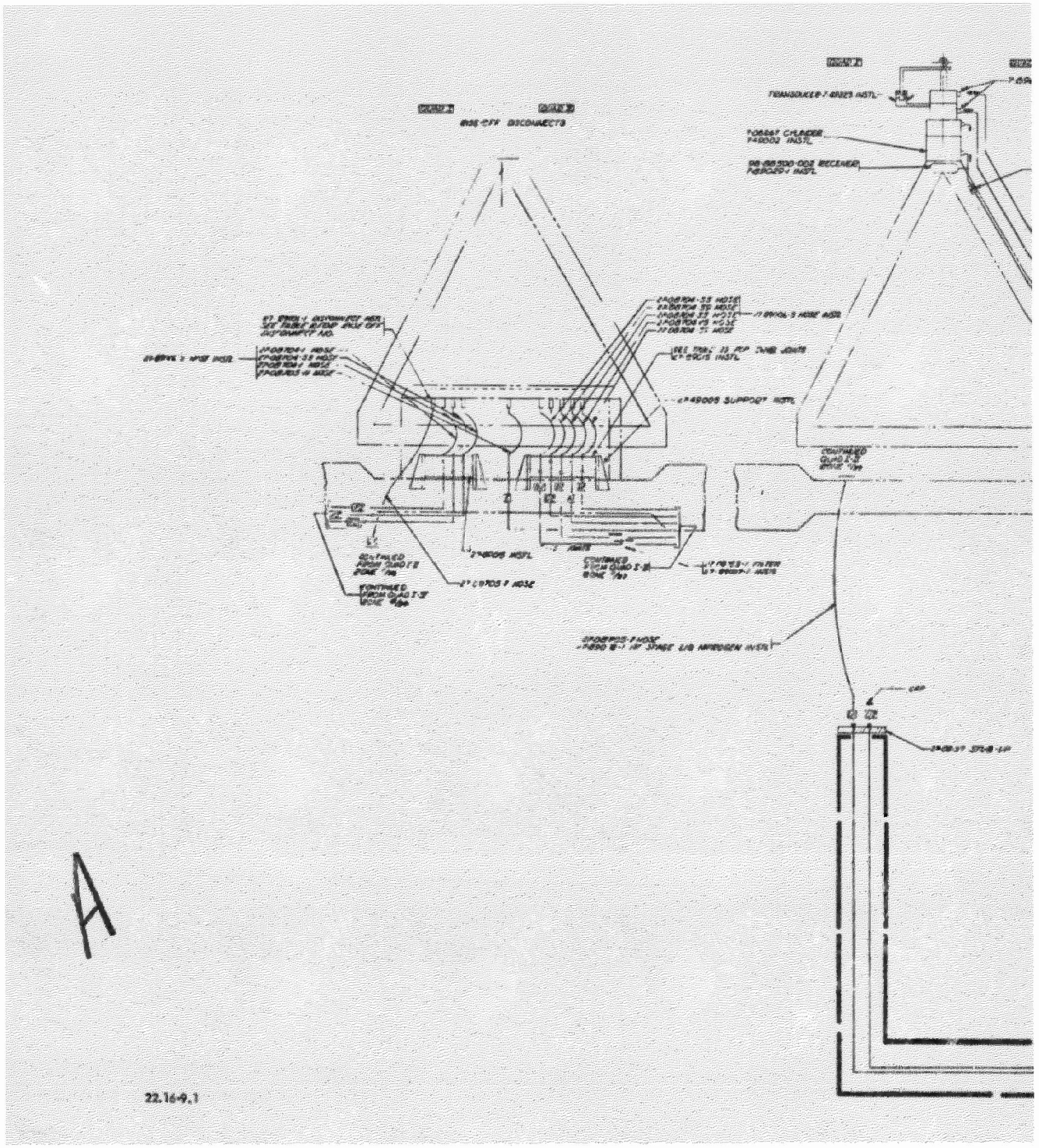
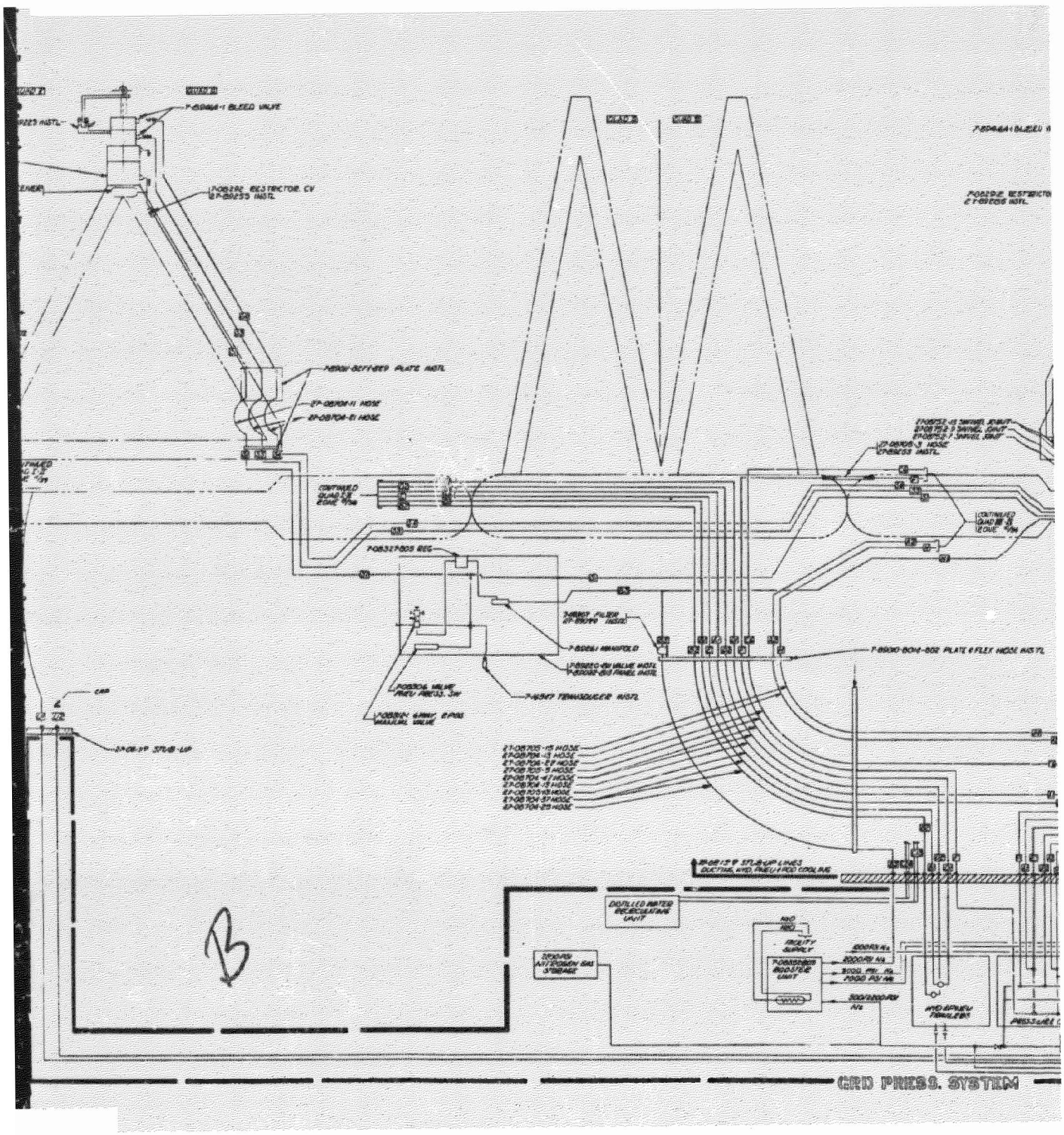
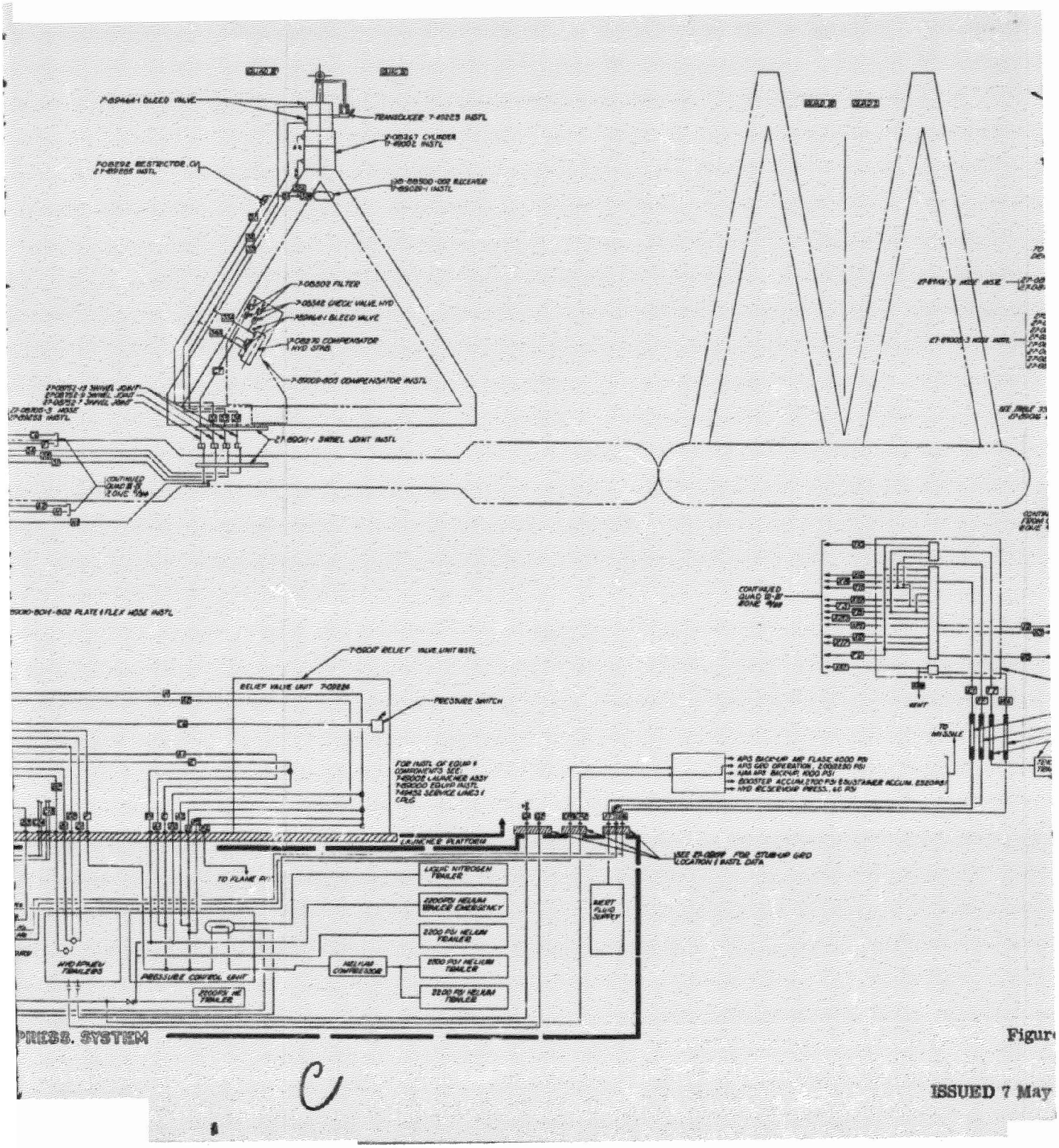


Figure 2-4. Schematic Diagram, Hydraulic and Pneumatic Lines, Launcher Systems (7-89101) B and C Series, Static Sites (Sheet 2 of 2)



22.16-9.1


GRD PRESS. SYSTEM



PRESS. SYSTEM

Figur

C

ISSUED 7 May

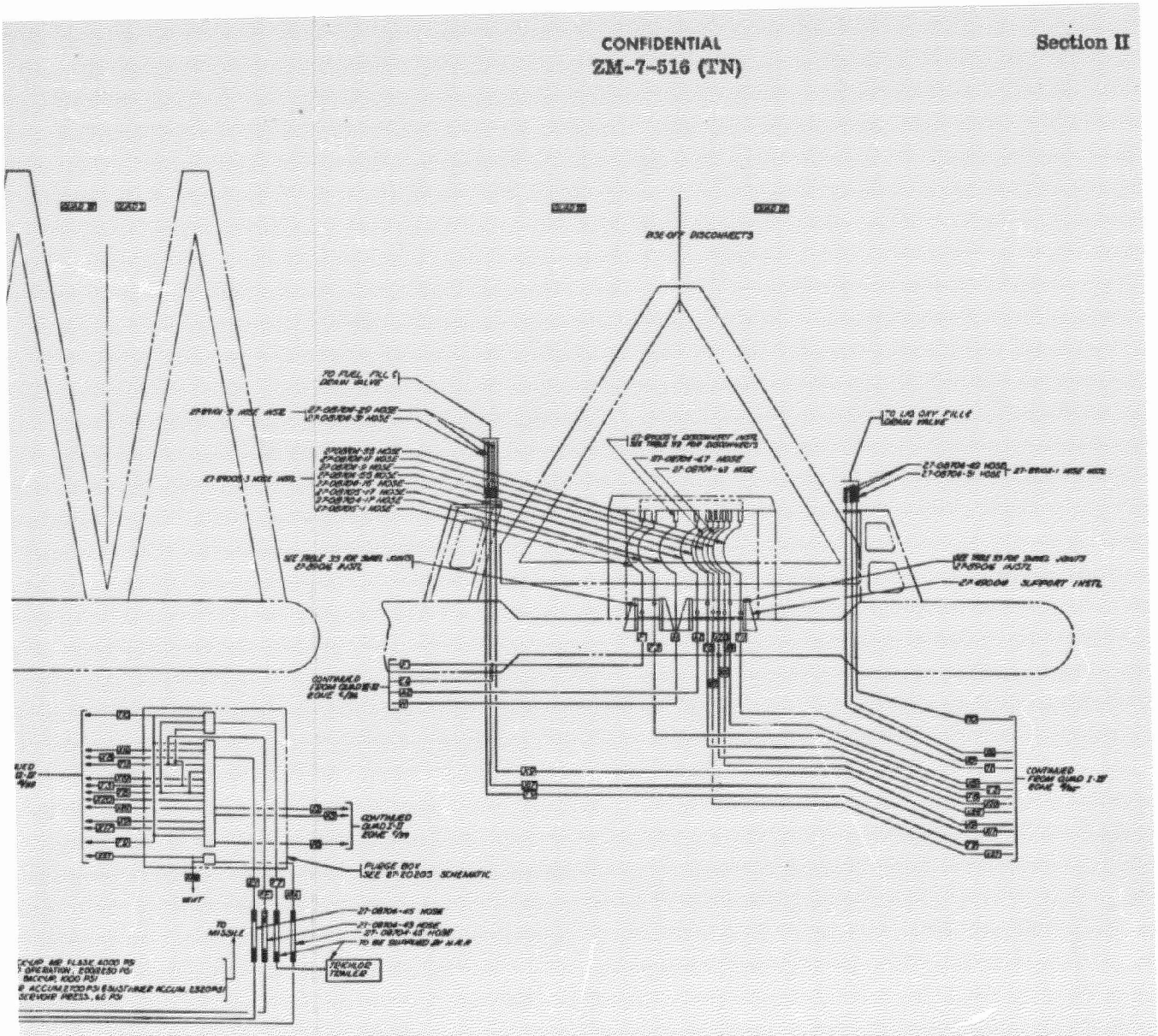


Figure 2-5. Schematic Diagram, Hydraulic and Pneumatic Lines, Launcher Systems (7-89101), D(R and D) Series, Static Sites (Sheet 1 of 2)

TABLE 31					
LINE CODE	LINE SIZE	OPERATING PRESSURE	FLUID MEDIUM	TYPE FITTING	LINE FUNCTION
A1	[illegible]	125	HELIUM	AN	FUEL TANK PRESSURE SENSING - MISSI[illegible]
A2	[illegible]	125	HELIUM	AN	LIQUID OXYGEN TANK PRESSURE SENS[illegible]
B1	[illegible]	3000	HYD-5606	AN	1st STAGE HYD. PRESS. - MISSILE
B2	[illegible]	3000	HYD-5606	AN	2nd STAGE HYD. PRESS. - MISSILE
B3	[illegible]	2000	NITROGEN	AN	NITROGEN SUPPLY, LOW PRESS. - LAUN[illegible]
C6	[illegible]	3000	HELIUM	AN	HELIUM CHARGE, PRESS. SENSING - [illegible]
C7	[illegible]	2000	NITROGEN	AN-MS	PNEU. KIT, COMPENSATOR, AUX. STRD. [illegible]
C9	[illegible]	7000	NITROGEN	[illegible]	NITROGEN CHARGING PANEL - HIGH P[illegible]
C10	[illegible]	1000	NITROGEN	MS	NITROGEN CHARGING PANEL - LOW PR[illegible]
D1	[illegible]	150	HYD-5606	AN	1st STAGE HYD. RETURN - MISSILE
D2	[illegible]	150	HYD-5606	AN	2nd STAGE HYD. RETURN - MISSILE
E	[illegible]	125	HELIUM	[illegible]	FUEL TANK PRESSURIZATION - MISSI[illegible]
F	[illegible]	3000	HELIUM	AN	HELIUM CHARGE - MISSILE
G	[illegible]	125	HELIUM	[illegible]	LIQUID OXYGEN TANK PRESSURIZATI[illegible]
H1	[illegible]	2000	NITROGEN	AN	NITROGEN SUPPLY, LOW PRESS. [illegible]
J1	[illegible]	1400	NITROGEN	AN-MS	PNEU. KIT, AUX. STRD. SYS. - LAUN[illegible]
S3	[illegible]	4000	HYD-5606	AN	HYD. CROSSOVER, AUX. STRD. SYS. [illegible]
S4	[illegible]	4000	HYD-5606	AN	HYD. CROSSOVER, AUX. STRD. SYS. [illegible]
S2B	[illegible]	[illegible]	NITROGEN	AN	PNEU. KIT, AUX. STRD. SYS. - LAUN[illegible]
S3B	[illegible]	[illegible]	HYD-5606	AN-MS	HYD. COMPENSATOR, AUX. STRD. SYS. [illegible]
S4B	[illegible]	[illegible]	HYD-5606	AN-MS	HYD. COMPENSATOR, AUX. STRD. SYS. [illegible]
T3	[illegible]	1000	TRICHLOR	AN	SUSTAINER FUEL, [illegible] PURGE - [illegible]
T7	[illegible]	300	TRICHLOR	AN	TRICHLOR PORT - ENG. FLUSH SUP[illegible]
T8	[illegible]	1000	TRICHLOR	AN	OXIDIZER DOME PURGE - [illegible]
T9	[illegible]	1000	TRICHLOR	AN	FUEL FILL & DRAIN TRICHLOR FLUSH[illegible]
T10	[illegible]	1000	TRICHLOR	AN	OXIDIZER FILL & DRAIN TRICHLOR [illegible]
[illegible]	[illegible]	1000	NITROGEN	AN	[illegible]
[illegible]	[illegible]	1000	NITROGEN	AN	[illegible]
[illegible]	[illegible]	1000	NITROGEN	AN	[illegible]
[illegible]	[illegible]	1000	NITROGEN	AN	OXIDIZER FILL & DRAIN OPEN - [illegible]
[illegible]	[illegible]	1000	NITROGEN	AN	FUEL FILL & DRAIN OPEN - [illegible]
[illegible]	[illegible]	1000	NITROGEN	AN	FUEL FILL & DRAIN CLOSE - [illegible]
[illegible]	[illegible]	1000	NITROGEN	AN	OXIDIZER FILL & DRAIN CLOSE - [illegible]
[illegible]	[illegible]	1000	NITROGEN	AN	[illegible] PURGES - [illegible]
[illegible]	[illegible]	1000	NITROGEN	AN	[illegible] ENGINE PURGE - [illegible]
R1	[illegible]	1000	NITROGEN	AN	OXIDIZER NITROGEN SUPPLY - [illegible]
[illegible]	[illegible]	1000	[illegible]	AN	INERT FLUID FILL SUPPLY - [illegible]
P4	[illegible]	1000	NITROGEN	AN	PRESS. SW. CHECKOUT - [illegible]
U1	[illegible]	[illegible]	LIQ. N2	[illegible]	1st STAGE LIQUID NITROGEN - [illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] GAS GENERATOR FUEL [illegible]
[illegible]	[illegible]	3000	HYD-5606	AN	HYD. SUPPLY
[illegible]	[illegible]	3000	HYD-5606	AN	HYD. RETURN
X26	[illegible]	3000	NITROGEN	AN	SPS GROUND NITROGEN SUPPLY [illegible]
X27	[illegible]	3000	NITROGEN	AN	SPS PRESSURE & VENT - [illegible]
X28	[illegible]	3000	NITROGEN	AN	SPS VENT ([illegible]) - [illegible]

TABLE 32 [illegible]		
DWG. NO.	DESCRIPTION	LINE CODES
27-08230	MISSILE HYD. 1st & 2nd STAGES, LAUNCHER	B1,B2,D1,D2
27-08521	LIQ. OXY. TANK PRESS. [illegible], LAUNCHER	A2,E,N
27-[illegible]	FUEL TANK PRESSURIZATION, LAUNCHER	A1,E
27-[illegible]	MISSILE HELIUM CHARGE, LAUNCHER	F,C6
27-[illegible]	AUXILIARY STABILIZING SYSTEM, LAUNCHER	S2,S4,S2A,S3A,S4A,J1
27-[illegible]	LIQ. OXY. VALVE, LAUNCHER	T10, X6, X18
27-[illegible]	FUEL VALVE, LAUNCHER	T9, X5, X17
27-[illegible]	PURGE SYSTEM LAUNCHER	P? , X1, X8, T8, T3, T8, T11, 13, X3, X11, [illegible]
27-20[illegible]	1st STAGE LIQUID NITROGEN - LAUNCHER	U1
27-[illegible]	LAUNCHER AND SUPPORT SYS. [illegible] "B" [illegible] SERIES	[illegible]
27-[illegible]	[illegible] SYSTEM [illegible]	R1
27-[illegible]	[illegible] - LAUNCHER	[illegible]

TABLE 33		
LINE CODE	GRD. HALF DISCONNECT	SWIVEL JOINT
A1	27-08[illegible]-3	27-08[illegible]-5
A2	27-08[illegible]-3	27-08[illegible]-5
B1	27-08[illegible]-1	27-08[illegible]-11
B2	27-08[illegible]-1	27-08[illegible]-11
D1	27-08[illegible]-1	27-08[illegible]-9
D2	27-08[illegible]-1	27-08[illegible]-9
E	27-08[illegible]-3	NONE
F	27-08[illegible]-3	27-08[illegible]-5
N	27-08[illegible]-3	NONE
T3	27-29004-7	27-08[illegible]-7
T8	27-29005-7	27-08[illegible]-9
T11	27-29005-7	27-08[illegible]-9
X2	27-29003-7	27-08[illegible]-1
X3	27-29003-7	27-08[illegible]-1
X9	27-29004-7	27-08[illegible]-7
X20	27-29010-7	27-08[illegible]-3
P5	27-29003-1	27-08[illegible]-1
U1	27-08[illegible]-3	NONE
X25	27-29004-7	27-08[illegible]-9
X27		27-08[illegible]-11

34. DESCRIPTION OF FITTINGS (SEE TABLE 31):
 A- FLARELESS "MS21900" SERIES (CRES).
 B- MARMAN PRODUCTS CO. INC., CAT. "3-1" SERIES JOINTS, CPLG & FLANGES, USING COPPER (NICKEL-PLATED) GASKETS.
 C- AMERICAN INSTRUMENT CO. "SUPERPRESSURE" CRES FITTINGS & TUBING (CAT. 406 & 407).
 D- FLARED "AN 800" SERIES (CRES).

33. SEE TABLES 31, 32, 33 & 34, SHOWN ON [illegible], FOR LINE CODES & SIZES, OPERATI[NG] PRESSURE, FLUIDS, SWIVEL JOINTS, & ASSOCIATED DRAWINGS, REPORTS, SPECS AND SCHEMATICS.

32. THIS SCHEMATIC DIAGRAM, 7-8901, REPLACES SCHEMATIC DIAGRAM PORTION OF 7-8900B. 7-8900 WILL CONTINUE TO SERVE AS A LINES INSTL. DRAWING AND BE FURTHER SHOWN AS AN ISOMETRIC ASSY DWG. FOR -1 & -3 ASSY ONLY. SEE 27-8900 FOR ISOMETRIC ASSY DWG. FOR -5 ASSY.

31. -5 ASSY INCLUDES ALL DATA ON SHEET 3 ONLY & IS LIMITED FOR "DAVID" SER[IES]. THIS DRAWING IS FOR ENGINEERING REFERENCE ONLY. SEE SHEET 2 FOR [illegible] DATA ON -3 ASSY ("B" SERIES) & SHEET 1 FOR COMPLETE DATA ON -1 ASSY ("A" [illegible]

NOTES:

TABLE 34	
LIST OF REPORTS AND SPECS. RELATED TO LAUNCHER OPERATION	
CONVAIR NO.	DESCRIPTION
G-70001	CLEANING PROCEDURES, FUEL SYSTEM COMPONENTS
G-70002	CLEANING PROCEDURES, LIQUID OXYGEN SYSTEM COMPONENTS
G-70003	CLEANING & MAINTENANCE OF CLEANLINESS OF HYDRAULIC SYSTEM COMPONENTS
[illegible]	[illegible] LAUNCHER HYDRAULIC & PNEUMATIC SYSTEMS - "B" SERIES
[illegible]	CHECKOUT PROCEDURE FOR LAUNCHER HYDRAULIC AND PNEUMATIC SYSTEMS - "B" SERIES
[illegible]	LEAK TESTING PROCEDURE FOR LAUNCHER HYDRAULIC AND PNEUMATIC SYSTEMS - "B" SERIES

22.16-9.2

A

Fig

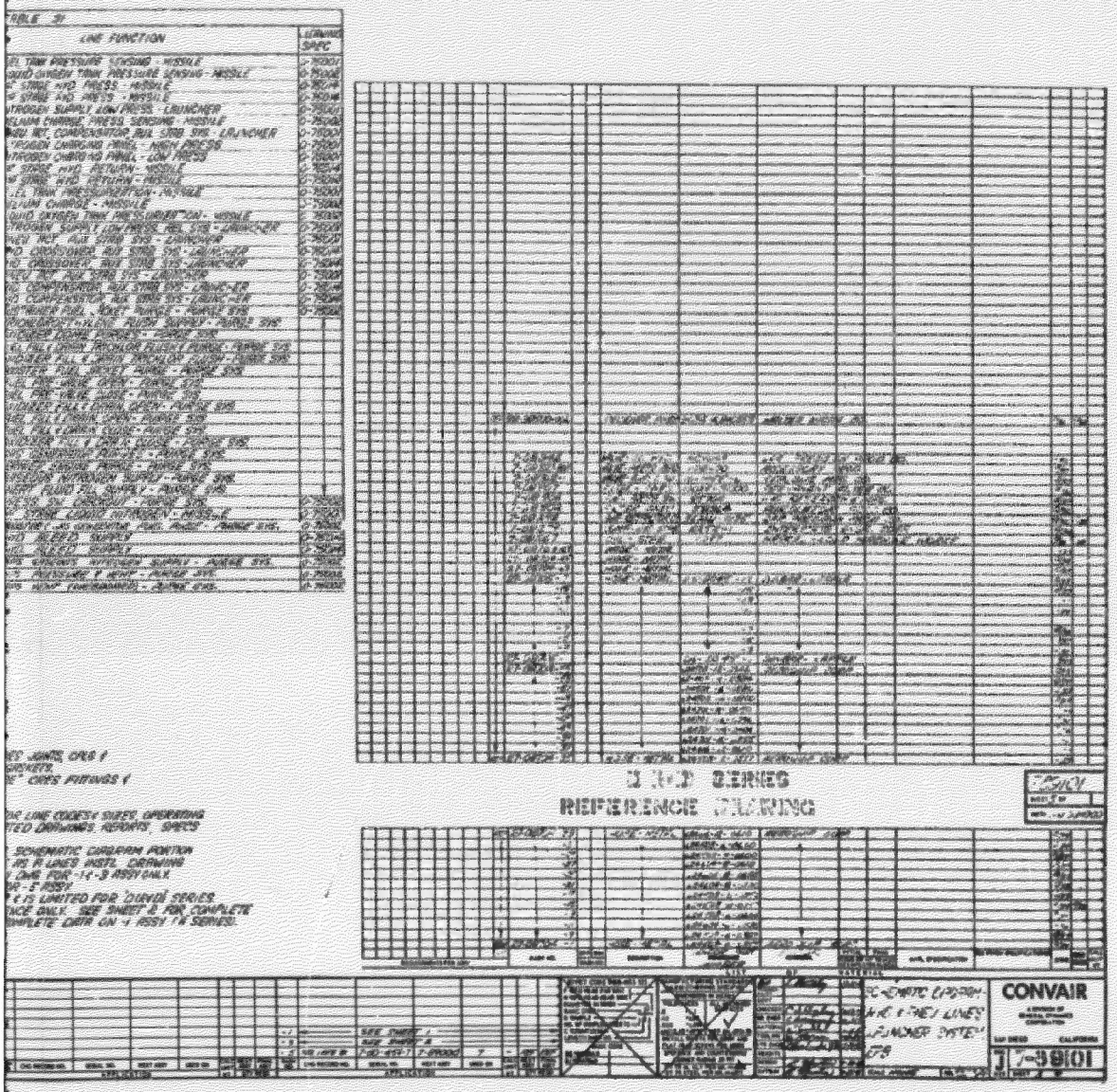


Figure 2-5. Schematic Diagram, Hydraulic and Pneumatic Lines, Launcher Systems (7-89101), D(R and D) Series, Static Sites (Sheet 2 of 2)

connected to the missile. See 7-89023. The lines are helium pressurized to 125 psig by the pressure control unit and regulated by the hydraulic and pneumatic cart, 7-09241. From the ground stubup, the control line is routed (via the launcher) into the auxiliary frame by flexible hose, through the MS 28751-4-0900 hose, to a fitting on the 7-84005 missile valve installation.

CAUTION

After pressurizing the missile hydraulic reservoir, the ground charge hose installation, 7-89023, must be removed.

d. For D(R and D) Series, pressurization of the hydraulic reservoir is accomplished by the 7-08411 Nitrogen Charging Panel; see Convair Report AZE-27-188.

2-8. ASSOCIATE SYSTEMS AND EQUIPMENT.

2-9. ELECTRICAL CONTROL SYSTEM.

a. A hold-down and release READY light (green) will glow (on the test conductor's panel in the blockhouse) when the following conditions are met:

1. The two slave cylinder arms are in the ready position, actuating two limit switches.

2. The release cylinder line pressure switch is actuated, indicating a minimum pressure of 5300 psig.

3. The umbilical plug circuit selector is in the LAUNCH position.

b. A LAUNCH button of the holding type (on the test conductor's panel) will activate the 99-35002-001 solenoid valve to initiate missile release.

c. A single warning horn and individual warning lights (red) are located at the blockhouse control station. A red light will glow and the warning horn will sound if a signal from any one of the following sources is received:

1. When the auxiliary support stabilizer system pressure drops below 900 psig (B and C Series) and 1200 psig (D(R and D) Series), the 7-08306 pressure switch breaks contact.

2. When the pressure in the 2000 psig main nitrogen gas supply drops to 1800 psig, the pressure switch breaks contact. (This line supplies pressure to the launcher systems.)

3. When the pressure in the main release cylinder line drops to 2300 psig, the pressure switch breaks contact.

4. In the event of an unsafe missile vertical alignment, the stabilizer synchronization indicator contact breaks.

5. When either of the 7-08264 slave cylinder arms moves from its ready position, the limit switch breaks contact.

d. The removable control panel at the service tower is similar to the blockhouse control panel but with the addition of a main release cylinder CHARGE and LAUNCH switch. This panel will control the launcher system during erection and prior to the time that the launcher system is to be transferred to the blockhouse. At the time of transfer, the wiring will be disconnected from the removable control panel and connected to the blockhouse control panel and the test conductor's circuit.

NOTE

The flight launchers at AFMTC (7-80, -8, 9, 10, and 11) contain all the systems previously described and are used for short duration static firings with the addition of the 7-49070 hold-down links.

2-10. STATIC SITE EQUIPMENT.

a. The static sites S4C (7-80-5 and -7) and ERB (7-80-2 and -4) require no controlled missile release provisions. The static site launchers do not have operating hold-down release cylinders, slaving systems, or auxiliary support frame retraction systems. The 7-89366 hold-down release cylinder of the flight installations is replaced with a dummy cylinder in addition to the hold-down links. A static link is substituted for the 7-08247 auxiliary support retraction cylinder during missile erection. This link is removed prior to any static firings to eliminate unnecessary loads on the missile.

SECTION III

CHECK PROCEDURES PRIOR TO MISSILE ERECTION

3-1. PREPARATION FOR USE.

3-2. Before the missile can be erected, the launcher pneumatic system must be pressurized as follows:

a. Install the three 7-08276-9 hoses.

b. Set the four 99-34003-001 needle valves to position the auxiliary support frames so that the stabilizer pins, 7-49006, are 62 inches on either side of the centerline of the 7-49021 missile support pins (Y-Y Axis).

c. Set the 7-08312 valve to the B (exhaust) position.

d. Set the 99-35002-001 solenoid valve to the C (vent) position.

e. Check the 7-08279 and 7-08280 temperature compensators; they should read within ±10 degrees F of the ambient temperature.

CAUTION

Before pressurizing the launcher system, the 7-08396 main release valves must be in the EXHAUST position (7-08264 slave cylinder extended).

f. Check the missile service tower electrical control system for operational readiness; turn off the alarm switch.

3-3. The 7-08352 pneumatic booster unit is prepared for use as follows:

a. Operate according to the instructions given in Reports ZJ-7-048 and AZE-27-192.

b. Set the selector switch to 3200 psig nitrogen output.

c. After activation, check the booster unit gages for the following pressures:

1. 2000 psig outlet pressure to launcher

2. 3200 psig outlet pressure to release system.

3-4. The electrical safety system at the missile service tower is checked as follows:

a. Warning lights should indicate the following:

1. 900 psig stabilizer nitrogen pressure ON.

2. 2300 psig release cylinder pressure OFF.

b. Vertical indication must be within limits.

c. CHARGE-LAUNCH switch at NEUTRAL.

3-5. The launcher is checked as follows:

a. The 7-49006 stabilizer pins must be synchronized.

b. The 7-08279 and 7-08280 temperature compensators should read ambient temperature.

c. Auxiliary frames in closed position (7-08247 cylinder extended).

This page intentionally left blank.

SECTION IV

OPERATION

4-1. LOADING MISSILE IN LAUNCHER.

a. Make an electrical check as follows:

1. All annunciator lights except those for the 1800 psig and 2300 psig pressure switches should be ON.
2. Stabilizer meter should be centered.

b. Erect the missile, launcher, and trailer to a vertical position, in accordance with report ZM-7-200E(TN).

c. Before trailer has been lowered to the ground, pressurize the 7-08267 stabilizer cylinders as follows:

1. Check for equal dimensions between the 7-49006 stabilizer pins and the missile.

CAUTION

Before shifting the 7-08312 valve as stated in paragraph 4-1c, 2, below, be certain that all four static links are in place or that the holddown release cylinder is pressurized.

2. Shift the 7-08312 valve to the A (pressure) position; this places a thrust load on the missile of approximately 34,000 pounds (B and C Series) and 38,630 pounds (D (R and D) Series) at each pin. The hydraulic component has no effect on the thrust if the stabilizer cylinders have been properly aligned and no wind loads are present.

d. Adjust the nose stabilizer (7-93004 or 7-93059) in accordance with report ZM-7-200E(TN).

CAUTION

If the nose stabilizer is not used, one of the following conditions must be maintained, whether or not the missile is in stretch:

1. The stabilizer cylinders (7-08267) remain pressurized.
2. Shims installed in accordance with paragraph 4-1-e. This option may only be used if the missile is empty.

e. If shims are to be installed in lieu of leaving the stabilizer cylinders (7-08267) pressurized, the installation is as follows:

1. Pressurize the stabilizer cylinders (7-08267).
2. Install shims between the top of the auxiliary support frame cap (7-49006) and the under side of the stabilizer pin collar (7-49006). Shims are to be of sufficient thickness to leave a gap of .045± .005 inch.
3. Depressurize stabilizer cylinders.

The shim installation (27-89024) or equivalent is to be used.

NOTE

To remove shims, pressurize the stabilizer cylinders (7-08267).

f. For the B and C Series, align the quick disconnects and move the brackets (7-49132 and 7-9415) slowly to position, taking care that the disconnects engage the missile properly.

g. For D(R and D) Series, the quick disconnects are aligned and engaged during horizontal mating of the missile to the launcher.

4-2. ELECTRICAL CONTROL AT MISSILE SERVICE TOWER.

a. Check the following:

1. Electrical control panel lights are out.
2. Synchronizing control centered within limits.

4-3. PREPARATION FOR MISSILE RELEASE OR STATIC FIRING.

a. Switch main release switch to CHARGE and hold for five seconds.

CAUTION

Check both release cylinders to see that they are bottomed before charging.

b. Check the following at the missile service tower:

1. All control lights out.
2. Synchronizing indicator is centered.

c. Turn the alarm switch ON.

NOTE

With the alarm switch ON, the source of any malfunction monitored by the safety system will be indicated by an alarm bell and light.

d. Close the two 99-34003-001 pressure valves (auxiliary support frame control).

e. Open the two 99-34003-001 vent valves.

f. Remove the three 7-08276 hoses (red streamers attached).

g. Install dust caps where the hoses were removed.

h. Set the 7-08352 booster unit to 7000 psig. (Approximately three hours are required to raise the pressure from 3000 psig to 7000 psig).

i. Make the following electrical changes:

1. Inactivate the control unit at the missile service tower.
2. Activate the control at the blockhouse.
3. Energize the solenoid to fill the missile with fuel.

j. When the booster unit reaches hold-down pressure (gage at booster unit outlet), the 5300 psig pressure switch will indicate READY.

k. When the above conditions are met, the ready light (green) on the test conductor's panel should glow, indicating readiness of the launcher pneumatic system. (Launch button may be pressed).

NOTE

For operational checkout of the propulsion control valve installation, see Convair Report ZK-7-049.

4-4. REMOVAL OF MISSILE FROM LAUNCHER (ABORTED FLIGHT).

a. Reset the 7-08352 booster unit to 3000 psig.

b. Change the electrical safety system operation back to the service tower.

c. Erect the missile trailer.

d. Switch from tower-missile pressurization to trailer-missile pressurization.

e. For B and C Series, lower the 7-49132, 7-49152, and 7-49476 disconnect brackets.

f. Connect the missile trailer to the missile.

g. Shift the 7-08312 valve to the B (exhaust) position before disconnecting the load cells from the launcher.

h. Inactivate the auxiliary support frame as follows:

1. Connect the 7-08276-9 hoses.
2. Close the two 99-34000-001 vent valves.
3. Open the two 99-34000-001 pressure valves.

i. Disconnect supply lines W1, R1, and T7 from the propulsion control valve installation.

j. Disconnect liquid nitrogen supply lines U1 and U2 (B and C Series) and U1 (D(R and D) Series).

k. Shift switch at the missile service tower panel to LAUNCH position (energizing solenoid 99-35002-001) in order to relieve pressure from the release cylinders.

WARNING

Stand clear of exhaust ports on main release cylinders when the switch is shifted to LAUNCH.

4-5. STANDBY PROCEDURE.

a. With the missile empty, check the following:

1. Booster unit (7-08352) set at 3200 psig.
2. Auxiliary frames are ready (7-08276 hoses removed).
3. Electrical safety system control at service tower.

b. With the missile fueled, check the following:

1. Booster unit (7-08352) set for 7000 psig.
2. Auxiliary frames are ready (7-08276 hoses removed).
3. Electrical safety system control at the blockhouse.

4-6. EMERGENCY OPERATION.

a. If the stabilizing pressure drops below the safe limit with an empty missile inside the service tower, the following emergency operation applies:

1. Clear the area of all personnel except the emergency operators.
2. Turn off the alarm.
3. Secure the missile with the upper support (nose cone stabilizing bar); screw stop nuts in. (See Convair Report ZM-7-193).
4. Vent and repair the 2000 psig system.

b. If the stabilizing pressure drops below the safe limit with a full missile outside the service tower, the following emergency operation applies.

1. Turn off the alarm.
2. Empty and purge the missile of fuel and oxidizer through the fuel and oxidizer pumps.
3. Check the emergency helium pressure for 1100 psig minimum (B and C Series).
4. Bring up the missile service tower.
5. Secure the missile at the upper support.
6. Vent and repair the 2000 psig system.

c. If the main supply pressure falls below the safe limit of 1800 psig, with an empty missile inside the service tower, the following emergency operation applies:

1. Clear the area of all personnel except the emergency operators.

2. Turn off the alarm.
3. Check the 7-08352 booster unit.
4. Secure the missile at the upper support.
5. Vent the pressure from the 2000 psig system and the emergency helium system (B and C Series); make the necessary repairs.

d. If the main supply pressure falls below the safe limit of 1800 psig, with a full missile outside the service tower, the following emergency operation applies:

1. Turn off the alarm.
2. Empty and purge the missile of fuel and oxidizer.
3. If the pressure is maintained above 1500 psig, move the service tower into place.
4. Secure the missile at the upper support.
5. Vent the pressure from the 2000 psig system and the emergency helium system (B and C Series); make any necessary repairs.

CAUTION

If the pressure falls below 1500 psig and the service tower and emergency upper support are not in place, the missile may lean enough to cause a tank section failure.

e. If the main release cylinder pressure falls below 2300 psig, with an empty missile inside the service tower, the following emergency operation applies:

1. Clear the area of all personnel except the emergency operators.
2. Turn off the alarm.
3. Check the 7-08352 booster unit; if the pressure is over 2200 psig, proceed with steps 4 and 5 below.
4. Secure the missile at the upper support.
5. Vent and repair the release pressurization system.

f. If the main release cylinder pressure falls below 2300 psig with a full missile outside the service tower, the following emergency operation applies:

1. Turn off the alarm.
2. Empty and purge missile of fuel and liquid oxygen.
3. If the pressure at the 7-08352 booster unit is maintained over 2200 psig, proceed with steps 4, 5, and 6 below:
4. Bring up the service tower.
5. Secure the missile at the upper support; screw in stop nuts.
6. Vent and repair the release pressurization system.

WARNING

If the pressure is under 2200 psig (empty missile), do not approach it unless the pressure is restored, the upper missile support is in place, or the static firing struts are in place.

g. If the vertical alignment of the missile is beyond tolerance on the synchronization indicator, with an empty missile inside the service tower, the following emergency operation applies:

1. Clear the area of all personnel except the emergency operators.
2. Turn off the alarm.
3. Secure the missile at the upper support.

4. Vent the 2000 psig system and make any necessary repairs.

h. If the vertical alignment of the missile is beyond tolerance on the synchronization indicator, with a full missile outside the service tower, the following emergency operation applies:

1. Turn off the alarm.
2. Empty and purge missile of fuel and liquid oxygen.
3. If the missile stays within 1/2 degree of the vertical (measured at the theodolite stations), proceed with steps 4, 5, and 6 below:
4. Bring up the missile service tower.
5. Secure the missile at the upper support; screw stop nuts in.
6. Vent the 2000 psig system and make any necessary repairs.

NOTE

If the main release cylinder falls below 5200 psig, launch cannot be made; (follow procedure listed under paragraph 4-6c).

SECTION V

MAINTENANCE

5-1. PREVENTATIVE MAINTENANCE.

NOTE

For maintenance, see Preventative Maintenance Technical Manual ZE-7-087A, Pneumatic Booster Unit.

SECTION VI

TROUBLESHOOTING

6-1. TROUBLESHOOTING.

6-2. MISSILE HOLDDOWN AND RELEASE CYLINDER CONTROL.

Trouble and Probable Cause	Remedy
a. Release mechanism fails to move.	
1. Burned-out solenoids in 99-35002-001 valve.	Replace solenoids.
2. Stuck spools in 99-35002-001 valve (caused by dirt).	Replace valve
3. Lack of nitrogen pressure.	Check functioning of pneumatic booster unit and nitrogen charging unit.
b. Slave cylinders, 7-08264, do not reach full stroke or are not synchronized.	
1. Oil system not full (temperature compensator bottomed due to hydraulic leak).	Correct leak and refill system with oil.
2. Air in system.	Bleed system.
c. Release cylinders cannot be retracted.	
1. Cams in cylinders not engaging notches in piston rod.	To check, pull rod out second time; if second try fails, cylinder must be repaired or replaced.

6-3. STABILIZING SYSTEM

Trouble and Probable Cause	Remedy
a. Low stabilizing pressure (below 900 psig for B & C) (below 1200 psig for D)	
1. Malfunction of the 7-08327 regulator.	Replace regulator.
2. Inlet pressure too low.	Check functioning of pneumatic booster unit and nitrogen charging unit.
3. Line, fitting, or flexible hose with a pneumatic leak.	Tighten or replace.
4. Regulator pneumatic leak.	Replace regulator.
5. Temperature compensator 7-08279 pneumatic leak.	Replace temperature compensator.
6. Stabilizer cylinder 7-08267 pneumatic leak.	Dismantle cylinder and repair leak as necessary.

6-4. SYNCHRONIZATION SYSTEM.

Trouble and Probable Cause	Remedy
a. Inability to maintain synchronization.	
1. Lines, fittings or flexible hoses show hydraulic leakage.	Tighten or replace.
2. Seals in 7-08279 temperature compensator and 7-08267 stabilizer cylinder show leakage.	Replace seals.
3. Low nitrogen pressure to 7-08279 temperature compensator.	Check functioning of pneumatic booster unit and nitrogen charging panel.
4. Air in system.	Bleed system.

6-5. AUXILIARY SUPPORT RETRACTION SYSTEM.

Trouble and Probable Cause.	Remedy
a. Rebound of the auxiliary frames after missile release indicates malfunction of the 7-08327 regulator.	Replace regulator.